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Editorial Notes

A Pioneer's Passing

THOUGH the affliction of severe illness had fallen upon him some considerable time ago—illness by which he had been stricken in circumstances that intensified its poignancy—the knowledge that all was not well with him will have done nothing to lessen the feeling of regret throughout the Gas Industry at the death of one of its foremost engineers and a great administrator. In the case of those who, from day to day, or even from time to time, came under the influence of the charming personality of Charles Claude Carpenter, C.B.E., D.Sc., the sorrow at his passing must naturally be deepest, for they have lost a friend; but even those in the Industry who had not the privilege of knowing him personally are the poorer by his death, just as they are the richer by his life. The man has left us; but the spirit remains.

Upon many aspects of the Gas Industry Charles Carpenter has left his mark. So many aspects, and such big marks, as to carve his name indelibly upon the tablets of the Industry's history, and to earn the lasting gratitude of his colleagues. So many, and so big, as to leave us always wishing for more. Eighty years is a long time, and by far the greater portion of them was spent by Charles Carpenter in the service of our great Industry—all his working life, in fact. It has been a period of evolution, offering opportunities for a man of his calibre, who had enjoyed the good fortune of being "brought up" under the very eye of that great leader, Sir George Livesey. Some who read these lines, and whose memory goes back to the time of George Livesey, will probably agree that he was a man of strong opinions, intensely human, and a somewhat strict disciplinarian. These were qualities which half-a-century ago brought George Livesey a great triumph in the introduction of co-partnership, after a period of strife which his strength of character enabled him successfully to overcome.

Such was the man to whom the young pupil (and subsequently Engineer) at the Vauxhall Works of the South Metropolitan Gas Company looked up, and from whom he imbibed no doubt in large measure those qualities to which allusion has just been made. For some twenty years was George Livesey to devote to furthering a cause which is above all other industrial considerations—the cause of true co-operation between employer and employed. During those twenty years the world was a different place from what it is to-day; but human nature was the same then as it is now, and there seems no reason why a proposal put forward towards the end of the last century for the improvement of the relationship between master and man should not prove equally effective under the new conditions of the Twentieth Century.

Thus it is that, in considering Charles Carpenter's many claims upon the gratitude of the Gas Industry, one is inclined to place first his unswerving faith in, and his unceasing active support of, the principle of co-partnership. Inevitably the mind goes back to the days before the Great War, when the downright earnestness of George Livesey at the Co-Partnership Festivals at the Crystal Palace carried conviction to all who heard him. Small wonder is it that the same belief took full possession of those with whom he was in even closer contact. In later years we have heard Charles Carpenter expound the doctrine at Shareholders' Meetings of the Gas Companies of which he had control—no less sincerely, and surely no less effectively, because of a characteristic gentleness of voice and manner. It was a subject to which he was never tired of referring, and those associated with him will tell you that, to the full, he practised what he preached.

On the last occasion upon which he addressed in General Meeting the proprietors of the South Metropolitan Gas Company, in the early part of 1936, it was disquieting to note that the familiar voice did not carry quite so well as formerly, but we hoped that this might prove a passing phase. However, at the 1937 Meeting, Mr. Frank H. Jones, presiding in his place, found himself called upon to open a new chapter, for it was the first Meeting of the Company for over half-a-century that had not been presided over by either George Livesey or Charles Carpenter. To Mr. Frank Jones has fallen a great heritage; but on that score there is nothing to fear, inasmuch as he has already given ample proof of his ability to follow in the footsteps of his illustrious predecessors. What he himself has to live up to he explained to those present at the Meeting in the following few impressive sentences, each one of which bore the hall-mark of truth: "Dr. Carpenter is a man who is satisfied with nothing short of the highest and the best, and in furthering the interests of the Company to which he has devoted his life he has spared himself least of all. No man has worked harder for this Company. But he made too heavy a demand upon his physical strength, and the strain of events brought about his illness."

To his outstanding ability as an administrator Charles Carpenter added scientific attainments of an equally high order. Those who were privileged to be present upon the all

too few occasions on which he addressed The Institution of Gas Engineers—how greatly one wishes that there might have been more of these occasions—will recall the fascinating, yet forceful, manner in which he dealt with his material. He possessed a style of expression and displayed a mastery of his subject which were able to hold his audience spellbound. On other platforms, in other circumstances, as cordial a welcome awaited him; but, again, the opportunities of extending this welcome were too few. A whole-hearted believer in, and practitioner of, the principles of co-partnership, Charles Carpenter was, partly no doubt by reason of his markedly retiring nature, at the same time in many respects very much of an individualist. By his death the entire Gas Industry has lost a valued colleague, and those who knew him personally a loyal and generous friend.

William Young Memorial Lecture

THE choice of Sir Frederick West and his acceptance to deliver the William Young Memorial Lecture this year could not have been happier. William Young commenced a very illustrious career in the Gas Industry, and though it was not long before his energies were directed to the development of the shale oil industry his work has had a profound influence on the carbonization of coal and the treatment of gas, and throughout his life he was ever ready to give the Gas Industry the benefit of his experience. The late Sir George Beilby said of him that, as with the shale oil industry, so with the Gas Industry, he "fertilized it with new ideas." William Young was interested in carbonization in general and designed a retort on the continuous principle, in collaboration with Sir George Beilby, for the distillation of shale; and it was this retort which formed the basis of the inventions which were developed into the system of continuous carbonization in vertical retorts associated with the names of Samuel Glover and John West. The story of the development of the continuous vertical retort is among the most fascinating in the Gas Industry, and it was singularly appropriate that the William Young Memorial Lecture, given on Thursday last, should have been in the hands of Sir Frederick West, Vice-President of The Institution of Gas Engineers, whose name is honoured throughout the Gas Industry and whose life work has been devoted to the perfection of the continuous vertical retort.

The William Young Memorial Fund was instituted in 1910, and the first Lecture was delivered by Dr. Harold G. Colman in the September of 1912, since when the Lectures given by eminent men have added lustre to the Transactions of the North British Association of Gas Managers and, through the medium of the "JOURNAL," have reached the wide field of the Gas Industry in this country and abroad. We have spoken of the profound influence of William Young's work on the carbonization of coal and the treatment of gas. In this connexion we recall the words of Mr. E. V. Evans in the Memorial Lecture he delivered in 1928: "The investigations proceeding in the Gas Industry to-day are in many instances a simple extension or amplification of the basic principles conceived by Young. It was he who placed his finger on what may be considered to be the secret of the effective carbonization of coal, and that is the carefully controlled cracking of hydrocarbons in the presence of hydrogen; and the more thoroughly we explore the process, the more convinced do we become of the importance of this." William Young will always be remembered as the man who first seriously considered cracking in relation to coal carbonization. A research worker and a pioneer, he led the Gas Industry into a variation of gas technique which has grown immensely.

It was in 1928, too, that Mr. David Fulton remarked that the purpose of the William Young Memorial Lecture was "to instruct, to educate, to excite a desire to pursue and increase knowledge." It was fitting, then, that Sir Frederick West should take as his subject the education, training, and selection of the technical and administrative personnel of the Gas Industry. "To excite a desire to pursue and increase knowledge." We well know Sir Frederick's sympathy with the youthful idea; we have wondered, too, whether what he has done on behalf of what may be termed "technical" youth has been sufficiently appreciated. "Manchester leads—London follows." How often have we heard this statement, but we are not prepared to vouch for its accuracy or otherwise.

In technical education, however, in giving youth a chance, in exciting in him "a desire to pursue and increase knowledge," there is no doubt that Manchester has played a virile rôle. The men at the head of the City's administration have had much local pride—and justifiably so—a good deal of determination, and, what is essentially to the point, a firm desire to help the coming generation. Let us glance for a second on the activities in this direction of Sir Frederick West, assuredly a busy man. He is ex-Chairman and now member of the Sub-Committee for the Management of the Manchester College of Technology and of the Sectional Committees on Engineering and Industrial Administration; he is a member of the Court of the University of Manchester, and, of course, he was Lord Mayor of the City. The ideas—and there are many—enveloped in this year's William Young Memorial Lecture are, to say the least, worthy of consideration; and it will be agreed that nothing is more important to the Industry than the education, training, and selection of its future leaders, technical and administrative.

Education

As Sir Frederick remarked, carbonization and gas-works practice to-day are carried out with a precision of scientifically controlled operation which is a very great advance on the methods employed before the War, and this calls for a very different type of personnel in the retort house and in the control of the works generally. The same kind of development is to be seen in every branch of gas manufacture and distribution; and Sir Frederick's admirable summary of the duties which the gas engineer has to perform indicated the problems involved in his education and training. Again, the intelligent perusal of the reports submitted to the Institution by research workers in the Industry requires quite an extensive knowledge of chemistry and physics, and it is clear that a sound education in the fundamentals of these sciences is essential to the gas engineer to enable him to apply the results of their work in practice. This has been brought out time and again in the reports of the Board of Examiners of the Institution Education Scheme, which have emphasized that the young men from whom the technical personnel of the Gas Industry are to be recruited must begin with a good general education and with a sound knowledge of the elements of chemistry and physics, the two sciences upon which the superstructure of the technique of the Gas Industry is built.

In his Lecture Sir Frederick traced the development of the Institution Education Scheme from the date of its introduction in 1923, this part of the Lecture again constituting an admirable summary. Fitting reference was made to the debt

the Industry owes to the unselfish, untiring, and successful work put into the organization and administration of the Education Scheme by many members of the Institution, whether as examiners or as members of the central committee, particularly those working, in the first place, on the district committees in touch with the raw material from which the recruits are drawn. In connexion with the Scheme generally Sir Frederick put forward two suggestions. The first was that for internal students there is need for day courses in the larger technical colleges, so that students working and employed in the gas-works, and who sometimes have to travel considerable distances to the colleges, might be able to attend classes on one day in the week instead of having to travel three times per week for evening classes, as is very generally necessary to-day. For the study of ancillary subjects it should be possible to do much on these lines, but for the main subjects we see the difficulty of finding the necessary teaching staff. This staff is drawn from those working in responsible positions in the Industry, and the problem would be to render these men available for daytime teaching. The other suggestion was that, for external students, tuition by correspondence might be further developed; but Sir Frederick did not indicate on what lines such development might be carried out.

The Lecturer passed on to review the educational facilities provided at Leeds University and other universities and colleges. At the moment the degree course at Leeds is concerned almost exclusively with gas manufacture, but Sir Frederick mentioned that suggestions are being made that it should be considered by the University whether courses could not be extended to other sections of the Industry. In regard to education given at the universities we may call attention to the fact that the Imperial College of Science and Technology have under consideration the institution of a post-graduate course leading to a diploma in gas engineering. In this section of the Lecture Sir Frederick gave a brief comparison between the gas education facilities in Great Britain and those in certain of the great Continental countries, summarizing this survey by saying that "a study of the facilities for education on the Continent leads one to the reflection that our own system is commensurate with the important position which Great Britain holds in the Gas Industry of the world."

Mental development—a bright, possibly clear, intelligence—is of importance. But, pointed out Sir Frederick, that is not enough; "character" is of equal importance if the young aspirant to fame in the Gas Industry is to achieve his ambition. It would need some little knowledge of philosophy to define "character," but we think that what Sir Frederick meant particularly to stress was the capacity for leadership—and leadership through co-operation. "There are," he observed, "few instances where engineers operate in what may be termed a single-handed way. They are probably more dependent than any other profession on the help and co-operation of others to bring their plans to a successful conclusion." Who will disagree with this? Yet many a gas undertaking has failed to give full measure of service to the consumer through lack of co-operation between junior and senior—and very often the junior, fledged with the feathers of a bright intelligence, guaranteed by signatures on diploma parchments, has been to blame.

And this brings us to what we consider one of the most interesting of the many important aspects of training discussed in the William Young Memorial Lecture. This is training for industrial administration. It has been said that management is an art and does not lend itself to being taught, but management has nowadays acquired many of the characteristics of a science as well, and the science calls for training and application of a kind for which specific consideration and thought are necessary. Only a few weeks ago we commented in these columns on the activities of the Department for Business Training at the London School of Economics. Sir Frederick, in his Lecture, referred to what has been done in Manchester in this direction. Recognizing the problems of present-day works management the Manchester engineering employers, in conjunction with the Manchester College of Technology, have founded a Department of Industrial Administration which has for its object the development of suitable courses of study for those who are being trained for managerial positions. Sir Frederick suggested that such a course of study might be made available to those training for administrative posts in the Gas Industry. We know that the Department for Business Training at the London School of Economics receives support from the Industry, and it is undoubtedly important that problems of management and administration should not be overlooked or regarded as merely routine work which may be left entirely to be acquired by experience.

Salaries

SIR FREDERICK then dealt with the question of salaries in the Industry—a problem discussed freely of late in our correspondence columns. As Sir Frederick said, everybody will be in complete agreement as to the desirability of attracting to our Industry young men of the highest character and intellectual capacity, but "initiative, ability, and intellectual capacity can only be secured if the monetary reward is sufficient and compares favourably with that in other walks of life. It is certain that the Gas Industry will fail to attract the right type of man if the remuneration offered is so meagre (as it is in too many cases) as to be almost an insult to his intelligence and self-respect. . . . During the last few years there have been several examples of salaries offered by advertisement which exhibit, to say the least, a dangerous ignorance of the value of the services of adequately trained technical men. . . . The subject of salaries for technical and managerial positions in any industry from the point of view of fixing adequate or standard salaries is a difficult one, but it is surely not outside the scope or authority of some representative body of the Gas Industry to raise an emphatic protest when attempts are made, as they have been and will be, if no notice is taken, to lower the status and value of those responsible for the successful operation of gas undertakings." From time to time protests have been made, in the outcome, however, with little effect apart from focussing attention on a major problem. The Gas Industry, more at the present time than ever before, needs trained and active brains and ability; it will not get them unless it is prepared to pay for them. If it is not so prepared, it will in the long run—and not such a very long run—pay dearly for adopting a policy the reverse of far-seeing. It is good to know, however, that the salary problem is being deliberated by The Institution of Gas Engineers.

Another point made by Sir Frederick in the William Young Memorial Lecture was that gas engineering as a career should be made more attractive and that those responsible for the managerial functions should see to it that openings are made which provide a proper "pupilage" with suitable remuneration to secure a constant supply of well-trained men for the higher positions—remuneration during the period of pupilage sufficient, at any rate, to make a reasonable contribution to their livelihood. For some years now, of course, the Gas Light and Coke Company has operated a highly organized

and effective "staff pupil" scheme, the results of which should offer incentive to other undertakings to provide facilities similar in principle though on a different scale and modified to fit in with local conditions and requirements. Sir Frederick also urged undertakings in general to offer every facility to their technical officials to participate in the organized meetings and visits of interest which the various associations, both Senior and Junior, offer. This idea has always had our support and it is good that nowadays the opinion is rarely expressed that attendance at these meetings is not justified by the time involved and the expense incurred—that, except in comparatively few instances the broader outlook prevails.

Nothing but the best will suffice if the vast potentialities of the Gas Industry are to be translated into added load in an age of intense competition, and in focusing attention on the scope, the extent, and the quality of the education and training which are necessary for the gas engineers who in the future are to occupy posts of responsibility, Sir Frederick West, in the William Young Memorial Lecture, has performed a most useful service.

The Public Lighting Conference

IN this issue of the "JOURNAL" we continue our report of the important A.P.L.E. Conference at Bournemouth last week—the occasion when gas and electricity interests, which rightly or wrongly are scrapping with one another the year round for business, settle down amicably together for a few days to discuss how, as a comprehensive public lighting industry, they can best serve the public.

Among the Papers which we published last week was that of Mr. Thomas Wilkie, Public Lighting Engineer at Leicester, and in an Editorial comment we summarized views which Mr. Wilkie had expressed in criticism of the Home Office attitude towards the public lighting aspect of A.R.P. We make no apology for giving a very full report this week of a contribution to the discussion made by Mr. F. C. Smith, who, in voicing views often diametrically opposed to those of Mr. Wilkie, spoke with well-weighed words which were clearly the outcome of close study of the subject. This was a discussion in the best traditions of the Association, where public interests were uppermost in the mind and sectional bias entirely submerged, and we recommend a close study of both the Paper and Mr. Smith's comments to those who are still uncertain in their minds whether they would wish to black or not to black out.

In any event, and whatever the outcome of the preliminary announcement by the Home Office, the manufacturers of gas lighting equipment have been active in catering for emergency conditions by the production of various devices for the rapid extinguishing of lamps in connexion with A.R.P. Which brings us to the exhibition, staged at the back of the Conference Hall, of modern lighting fittings and accessories by the leading makers of gas and electrical appliances. Having inspected all the displays, we have no hesitation in congratulating those concerned upon a splendid co-operative effort, in which the gas side undoubtedly came out with flying colours.

If anyone still adheres to the time-worn belief that gas lighting is dead a glimpse of the stands would have given him a severe shaking. Everywhere among the exhibitors we experienced a feeling of optimism and a willingness to demonstrate every detail of a variety of new and interesting devices, reference to which is made in our description of the displays on later pages of this week's issue. In addition to emergency lighting and extinguishing mechanisms, features of particular interest included solar dials to compensate for the varying hours of sunset and sunrise without the necessity of re-setting the clock; lamps which can be operated by the amount of light falling on a light-sensitive cell, operated by a 3-volt battery, thus automatically switching on the installation as darkness falls, whether by sunset or fog; safety cut-off devices to obviate fires should a gas standard or bollard be knocked down by traffic collision; improved raising and lowering gear, together with many other developments which increase the general efficiency of gas lighting units. Such displays as this are all the more praiseworthy when it is appreciated that most of the exhibiting firms are normally in competition with one another for the Gas Industry's business. But they are at the same time all members of the Lighting Section of the Society of British Gas Industries and, as such, are out to show by co-operative effort just what gas can offer to the lighting engineer.

Some two years ago the S.B.G.I. started a special "drive" on behalf of gas street lighting, backing up the united efforts of the Lighting Section by co-operation with the B.C.G.A. in the direction of increased publicity. The success of these efforts is shown by recent activities in the gas public lighting field, and still further developments may be anticipated in the near future. There is an opportunity here for the District Associations to play an increasingly important part in the education of their members in the latest methods of gas street lighting—not merely for their own advantage, but by way of supporting the valuable work of the S.B.G.I. and the other national bodies which are jointly concerned.

Once again we would urge gas undertakings to put "every ounce" into securing the public lighting load. In prestige alone it is well worth the effort. In this connexion the value of trial installations cannot be over-emphasized; many a useful contract has been obtained in the past by demonstrating to local authorities (without obligation) what gas can do. To smaller undertakings, however, this presents a problem which has been well-nigh insoluble through lack of funds to finance such installations. We say "has been" advisedly, for it will be found that if these smaller undertakings will approach the lighting firm with whom they usually do business the latter will be only too willing to assist them in a practical way by making arrangements for trial installations on favourable terms. This is just another service which our manufacturers are prepared to offer to the Industry; and appreciation of such a gesture can best be shown by taking full advantage of it.

In conclusion, and touching again upon such joint exhibitions as we have just seen at Bournemouth, it is interesting to recall an observation which we actually overheard in the Conference Hall. A gentleman, presumably a manufacturer, remarked to another: "Why should we bring our friends here and let them see all our competitors' goods?" Such a travesty of common-sense views is rather startling and disturbing in these days, and it is to be sincerely hoped that it represents the exception rather than the rule. If such a creed were common there would be no exhibitions of any kind, and the results of much valuable work would be wasted. We can only conclude that the gentleman in question had just lost a useful contract and was taking a jaundiced view of life in general. We feel sure that such an opinion does not represent the attitude of S.B.G.I. members who are working together for the benefit of the Industry as a whole.

OBITUARY

CHARLES CLAUDE CARPENTER, C.B.E., D.Sc., J.P.

The death on Wednesday, Sept. 7, at his home, 37, Cheyne Walk, Chelsea, of Dr. Charles Claude Carpenter, C.B.E., J.P., has removed from the Gas Industry one of its outstanding figures of all time. He was in his 81st year.

The circumstances surrounding Dr. Carpenter's last months of business activity are well enough remembered to need only brief reference at this time. The acrimonious campaign which was carried on by the Press and by many other means in the Autumn of 1936 against the tariff introduced by the South Metropolitan Gas Company must have been a bitter blow to one who had, all his life, shunned the glare of publicity of any kind. Particularly must he have been hurt by the direction of the attack towards the aspect of "grinding the faces of the poor" when so many of his interests had been devoted to sympathy with the working classes, as witness his life's work for the co-partnership movement. Whatever the merits of the dispute, however much or little he was moved by those stirring few weeks in South London, the whole of the Gas Industry and many others beside were deeply affected to learn, while the hubbub was still raging, that Dr. Carpenter had collapsed suddenly while presiding at a Board Meeting of the Commercial Gas Company, and was gravely ill. This was on Oct. 1, 1936, and from reports of the nature of the illness it was feared that his active career might be at an end. Confirmation of these fears was contained in the announcement in March, 1937, that, acting on medical advice, he had retired from the Presidency of the South Metropolitan Gas Company, and the Chairmanship of the South Suburban and Commercial Companies.

And so the Gas Industry has lost one of the greatest engineers and administrators who has ever devoted his life's work to its advancement. His vast knowledge of every phase of engineering science connected with the production of gas enabled him to obtain results which have often been the envy of his contemporaries in the Industry, while his wonderful grasp of detail rendered it possible for him to turn to practical advantage many little points in works control which to many might seem insignificant. But his attention to detail was by no means confined to gas-works practice as the very high standard he set in the South Metropolitan Gas Company's distribution system bears ample testimony.

Dr. Carpenter was a man who thought in advance of his time, as is clearly indicated in many of the earlier patents which appeared under his name and in the several ways in which the South Metropolitan Gas Company have introduced methods that have paved the way for general adoption in the Industry. He was the pioneer of a number of processes, many of which have subsequently become common practice. To mention but a few of these—the introduction of external producers, the purification of gas from carbon bisulphide, the automatic ignition of gas burners, designs of gas fires and cookers, the heat unit method of charge, the monthly system of accounting, the therm meter, and, one of the things for which he was best known outside the Industry, the furthering of the principles of co-partnership as conceived by Sir George Livesey. But perhaps his most notable achievements were concerned with the development and championing of gas lighting. He invented photometers of various kinds, designed lamp columns, carried out researches in regard to the regeneration of the mixture in street lamps, introduced the standardized burner, and finally was instrumental in producing the fine "Supervia" lamp which to-day is giving such magnificent results.

A young man, fresh from what is now the Birkbeck College, Charles Carpenter entered the Gas Industry as a pupil to the engineer in charge of the West Greenwich Works of the old Phœnix Gas Company—a concern which possessed other stations at Vauxhall and Bankside. It was at the last-named works that Dr. Carpenter later introduced the system of inclined retorts (described by him at the time in a Paper before The Institution of Gas Engineers) which stood practically unchanged until the closing down of the works only a few months ago. Full of enthusiasm for the application to technology of physical and chemical science, Charles Carpenter early attracted the attention of the late Mr. James Shand (Deputy-Chairman of the Phœnix undertaking and subsequently a Director and Chairman of the South Metropolitan Company after the amalgamation of the two concerns in the year 1880) and also of his successor Sir (then Mr.) George Livesey, by whom he was given an important post in the technical conduct of the Undertaking at an age which caused surprise to most of his contemporaries. It was in the year 1897 that he was appointed, by Sir George Livesey, Deputy Chief Engineer of the Company. The faith which Sir George held in him was fully justified, and upon the death in 1899 of his brother, Frank Livesey, Charles Carpenter, the junior member of the engineering staff, succeeded him as Chief Engineer of the Company. It is a matter of interest to record the fact that he was "sounded" in respect of his acceptance of a similar position with the two gas companies next in size to that with which he was then associated—namely, the Gas Light and Coke Company, and the Liverpool United Gas Company.

Among the professional work which brought him into prominence was the development of the Siemens method of firing in its application to the heating of gas retorts. The stumbling block to the rapid general extension of this principle had been the large capital expenditure necessary for the reconstruction of existing furnaces; but Dr. Carpenter showed that the change-over could be carried out with a very small outlay once the underlying principles had been mastered. Furnaces constructed upon the design developed by him still hold the field for simplified working. Another of his patents in connexion with carbonization processes, applied for in the year 1908, provided for "a core of coarse pieces being formed within a layer or layers of coal of greater fineness" in the retort charge, whereby it was claimed that better carbonizing results could be obtained.

As Livesey's lieutenant, Dr. Carpenter was closely associated with him in two important movements—namely, the application of the co-partnership principle to industry, and the modification in the methods of producing and evaluing town gas rendered possible by the epoch-making introduction of the Welsbach burner. For the latter purpose he worked out in the laboratory the details of what became known as the "No. 2 Metropolitan" burner, used all over the world as the official standard for the determination of the self-illuminating power of town gas. For the first time in the history of gas lighting this appliance enabled gases of widely differing values to be compared with each other while being consumed at a definite fixed rate. The method formed an invaluable link in bridging the interval between the sale of gas in respect of its candle-power quality and its calorific value as commonly employed to-day. Several of Dr. Carpenter's earlier patents were concerned with gas lighting, including an improved photometer for testing the illuminating value of ordinary and high-pressure Auer burners, while he was also an authority on the Argand burner. In 1914 he patented a device for automatically igniting gas burners with the use of an electric lighter consisting of a platinum coil or other filament, while another patent was concerned with a table photometer to facilitate the testing of a number of different samples of illuminating gas successively. His more recent efforts on behalf of gas lighting include, of course, the single gas-air burner adjustment, now standard practice in his Undertakings, together with the "Supervia" lamp for street lighting.

On the death of Sir George Livesey in 1908, Dr. Carpenter was elected to fill the vacancies thus arising on the Boards of the South Metropolitan and the South Suburban Companies, becoming immediately afterwards the head of the former Undertaking—an honour which, as was stated at the time in these columns, fell upon him without opposition as it was confidently hoped and expected it would. From this time onwards the part he played in industrial affairs was of increasing importance. Shortly after the outbreak of war he became associated with the late Lord Moulton in an endeavour to replace those dye products for which this country had previously been almost entirely dependent upon Germany. But it was not long before the need for high explosives became of paramount importance, and he was selected by Mr. Walter Runciman, then President of the Board of Trade, as a colleague of Lord Moulton on a Committee charged with the duty of remedying the deplorable shortage of high explosive components. It was largely in recognition of his work as a member of the Chemical Warfare Committee and Munitions Inventions Panel that Dr. Carpenter was the recipient of the honour of C.B.E. in 1920. Three years prior to this, however, the Board over which he presided had performed a valuable service by leasing to the Government, at a peppercorn rent, sufficient land at the East Greenwich Works of the South Metropolitan Gas Company to allow of the erection of that wonderful national institution, the Fuel Research Station,

which has since done so much for the advancement of industrial processes connected with coal treatment. Another of what may well be regarded as Dr. Carpenter's masterly pieces of foresight was in connexion with the supply of Monazite sand used in the manufacture of gas mantles. There was a very real danger at one period during the war of Germany's gaining control of the generally recognized Monazite deposits, which would have had a disastrous effect; so Dr. Carpenter, realizing the situation, bought a Monazite mine in South America.

During the important period of the war years Dr. Carpenter was President of the Society of Chemical Industry, with its branches not only all over Great Britain, but in Canada, Australia, America, and elsewhere. At this time the chemical manufacturers of the country were not united in any organization, and in many cases they did not even know one another. With the collaboration, however, of Dr. Ree, of Manchester, and Dr. Alexander Scott, of London, Dr. Carpenter was instrumental in laying down the lines of and forming the Association of British Chemical Manufacturers, being himself on the first Provisional Committee and first Chairman of the Council. To-day that Association includes practically all the chemical manufacturers in Great Britain, and has developed into an all-important organization for the extension of chemical undertakings and the collaboration of those responsible for their control and policy. In 1920 Dr. Carpenter succeeded Dr. R. Messel as representative of the Society of Chemical Industry on the Governing Body of the Imperial College of Science and Technology. It was in the same year, incidentally, that he became Chairman of the Gas Companies' Protection Association, a body which he himself was largely responsible for bringing into being and which has since done such valuable work for gas companies throughout the country. He was still President of this Association at the time of his death.

Though many and varied have been the spheres of activity to which at one time or another his attention has been directed, it is primarily in connexion with the development of the South Metropolitan Gas Company that Dr. Carpenter would desire to be judged. He was long ago convinced that the future of gas undertakings was closely bound up with their dissociation from the many restricting and vexatious regulations that as a result of its long history encrusted and encumbered the machinery of the Gas Industry; and with characteristic patience and method he set himself to attempt a solution of these problems.

His long association with industrial matters, and his intimate knowledge of the underlying causes of discontent and disaffection, gave him an unusual insight into the aims and ideals of labour and he included a statesmanlike endeavour to meet these in a Private Bill deposited at the end of 1919. By that Bill, which became an Act in the following Session of Parliament, the right of capital to a reasonable return on its investment was associated with the right of the public to a reasonable priced article, and of the employee to a reasonable wage. (He was, of course, the Author of that widely read little book, "Industrial Co-Partnership," which ran into several editions.) After these considerations had been complied with, the profit remaining was as regards three parts returned to the consumer, and as to the remaining part divided equally between capital and labour, thereby increasing the dividends of the one and the earnings of the other. In other words, the principle was established of a basic price for the article to be sold which, while not precluding a higher one if circumstances were overwhelming, served as a starting-point for the calculation of dividend or wage additions to the normal rate of both. The weakness of the sliding scale had been drastically revealed in the economic upheaval of the War years.

As long ago as 1923 Dr. Carpenter applied for a patent in connexion with a therm meter, and in 1936, not without considerable difficulty, the South Metropolitan Company succeeded in obtaining Parliamentary sanction for its adoption on their district. Dr. Carpenter's more recent endeavours in connexion with the Company's block rate tariff call for no further comment at this time other than the further example they provide of his high ideals and unswerving aims.

Dr. Carpenter joined the first Incorporated Institute of Gas Engineers in 1890 and was a member of the first Council. He subsequently became Vice-President in 1894 and President twelve months later. He had been elected a member of the Southern Association of Gas Engineers—in 1886—and was President of that body in 1893. He read several Papers before both these bodies, and, indeed, provided many valuable contributions at one time or another to the technical literature of the Industry. It was in 1912 that the University of Leeds, in the centenary year of statutorily authorized and controlled gas supply, conferred the degree of Doctor of Science upon Mr. Carpenter, along with two other gentlemen whose names were at the time household words in gas activities—namely, Mr. Corbet Woodall and Mr. Thomas Newbigging. As we said in the "JOURNAL" at the time, the conferment of an honorary degree of the kind was no empty formality; it signified the deliberate choice by those high in the scientific and educational worlds of representative men whom they wished to honour for work, guided by their individual talents, that had conferred benefit on the world.

In 1914 he was appointed Trustee of The Institution of Gas Engineers Benevolent Fund. In the same year he was presented at the Annual Meeting of the Société pour l'Etude de la Participation aux Benefices with the Gold Medal of the Goffinon Prize in honour of the zeal with which the principle and practice of co-partnership has been so successfully applied by him for many years past. In 1923 he was elected a Member of Honour of the Dutch Gas Association. In 1925 he was the recipient of the Institution Birmingham Medal in special recognition of his outstanding services over a number of years. The medal had been awarded only ten times previously in the forty odd years since its foundation. In 1928 he was appointed a Justice of Peace for the County of London.

With Dr. Carpenter's election in 1926 to the Board of the Commercial Gas Company in succession to the Hon. Kenneth Mackay (he became Chairman of Directors in 1930), and his appointment in 1927 as Chairman of the South Suburban Gas Company there came into being the fusion of interests of the three big metropolitan and suburban companies which are commonly referred to as the "Carpenter Group."

The Doctor, so it was often said, was happiest in the draughting office, where he inspired a devoted staff of investigators; but, as has been remarked before, there were few details in the administration of a gas undertaking of which he was not complete master. Though in the very front rank of his profession, Dr. Carpenter was extremely retiring and shrunk at all times from anything in the nature of unnecessary publicity. He found recreation in music, literature, and the fine arts, and was a fervent advocate and supporter of the Alliance Française. He was married in 1896 and leaves a widow.

The funeral took place on Monday at Nunhead Cemetery, and was attended by a large gathering representative of all sides of the Gas Industry and notably many pensioners of Dr. Carpenter's Companies. A Memorial Service is to be held in Southwark Cathedral on Saturday next, at 3 p.m.

PERSONAL APPRECIATIONS.

From A. H. Andrews.

The passing of Charles Carpenter is a great personal loss to me. His quiet and peaceful end terminated a friendship which started when I entered the service of the South Metropolitan Gas Company nearly twenty-five years ago.

During this long period I was, as an official of the Company, closely connected with him and his work, and although this association was formal, as between Administrator and Officer, there grew between us a mutual interest and understanding that gradually developed in later years into a close and warm friendship.

It was a unique experience to work under Charles Carpenter, who was as quick to praise and reward as he was swift to condemn. I well remember at the first interview I had with him, after my appointment to the Company, how he made it plain and clear to me what was expected of those who served him—and never once did I know him swerve from his ideal of perfection in the performance of tasks undertaken by those in his service. He never accepted second best.

I feel honoured to-day that throughout these years I was privileged to serve and able to satisfy his exacting demands. This experience I prize and value, happy in the knowledge that it will strengthen my hand in attempting the tasks that lie ahead.

At all times I received at his hands uniform consideration and kindness, both in my official and private life.

The greatest attribute, for which many will esteem his memory, was his kindness and thoughtfulness for others, especially those who served him well.

His numerous gifts of books to me and other tokens of friendship which adorn my study will be treasured in memory of one for whom I had the profoundest respect and admiration.

My family also mourn with me the loss of this great and true friend. The articles of pupilage of my son to Charles Carpenter will seal the continuity of our esteem and regard for one to whom I owe much.

From G. M. Gill.

The passing of Dr. Charles Carpenter is an event which must inevitably set at work the minds of those who have worked with him in the course of his long career in the Gas Industry.

My time with him covered nearly three years during and four years after the Great War. It was a very troublesome time and changes of considerable magnitude were taking place almost daily during a good portion of this period.

It is impossible to have worked in close contact with Dr. Carpenter without being greatly impressed by many of his striking characteristics. He was probably the hardest worker that I

have ever known. His daily hours of work must have much exceeded those of most busy men. On numerous occasions he showed that he had been burning the midnight oil by the letters he wrote from home and the tasks for the staff which he brought to the office in the morning. He would take infinite pains in devising better methods of doing work. There was no limit to the time he would give when he made up his mind to solve a problem.

During his long career he had studied the technical details and design of everything used in the Gas Industry. He had a wonderful fund of knowledge and was always ready to take a keen interest in improvements in technical design.

He was always very insistent upon the meticulous carrying out of the policy which he laid down. There must be no variation from it. An instance of this was his very rigid insistence at all times upon the maintenance of a uniform quality of first-class gas. Woe betide the man who played any tricks with the quality. During the whole period of the War the gas supplied by the South Metropolitan Gas Company was maintained throughout at the same quality and with very little variation.

He was also insistent upon the maintenance of district pressures, and throughout the War, in spite of numerous shut-downs of gasmaking plant due to air raids, not only the quality but also the proper pressure of the gas was maintained throughout with the exception of a few hours due to a prolonged air raid, as a result of which pressures were reduced to some, but not to any serious, extent. Dr. Carpenter ordered an enquiry to be held over which he presided, and I remember the difficulty of persuading him that it was unavoidable.

These instances show the character of the man.

This rigid insistence upon the carrying out of a fixed policy was an education in itself and trained those under him to an enduring respect for thoroughness and reliability.

Slipshod ways were anathema to him. He was the most observant man I have ever known. Nothing was hidden from his eyes during a walk round the Works. This was evidently a habit inculcated from his earlier days when he had the reputation of being an exceptionally keen Gas-Works Manager with an eye that missed nothing.

He was a great patriot during the War and he would go to any lengths to help his country. An instance of this was the remarkable use of women labour during the War when most of the retort houses were "manned" entirely by women, but it was this type of virtually impossible task in which he revelled.

He had no love of games such as cricket and football, but he willingly authorized the laying out of a large sports ground for the employees and this was greatly appreciated.

He was always a friend of the working man and rigidly carried out the policy of paying the standard wages of the various trades with in addition a number of special benefits which formed part and parcel of the Co-Partnership System introduced so many years ago by the Company.

He was indeed a great advocate of the Co-Partnership system and obtained the full benefits from the system. He would take infinite pains to explain the system and all that it entailed to the Co-Partnership Committees which were composed half of workmen and half of officials. He gave up a great deal of time to the education of these Committees, the personnel of which changed periodically, and this policy undoubtedly had an excellent effect.

He was a man of great qualities and it was most unfortunate that in his last year of active work he should have been a victim of an organized Press opposition to the new Tariff which he sought to introduce. As a matter of fact no man has done more throughout his career to give the public a square deal than had Dr. Carpenter.

His passing takes from the Gas Industry a man who, for a long period of his career, was in the forefront of its technical developments, for a good many of which he was personally responsible.

From John Terrace, Hon. Secretary, The Institution of Gas Engineers.

Carpenter—to use the name by which he will no doubt now generally be known—was always a strong supporter of the professional bodies of the Industry, and joined the Gas Institute in 1885. In his early days as Engineer of the Vauxhall Works he read a Paper before the Southern Association in 1886 and two years later (1888) another on the same subject of Gaseous Firing of Retort Settings before the Gas Institute. During the period when the Industry was served by two professional bodies he contributed several Papers on a variety of subjects—Inclined Retorts, Distribution, &c.—to the Incorporated Institution of Gas Engineers and was President of that body in 1895. In 1905 he contributed a Paper on "The Report of the Recent Departmental Committee upon Metropolitan Gas Testing" to the amalgamated body, The Institution of Gas Engineers of to-day. The following year (1906), in a Paper, "Notes on Argand Burner," he described the famous Metropolitan Argand No. 2 Burner which was adopted by the Gas Referees. In 1914, at the Meeting in Liverpool, he gave a Lecture on "The Purification of Gas by Heat," showing how the sulphur compounds could be reduced and advocating that this should be done; and in 1922 he contributed a Paper on "Some Gas Burners and a Moral," in which he described the "Metro" Inverted Burner.

Carpenter, however, was not a man who courted publicity, and the foregoing Papers were only obtained from him through the influence of his friends and because he believed that the dissemination of the information would be of benefit to the Industry which he loved. Moreover, they do not give any adequate picture of the work he did for the Industry. He was essentially an individualist and could not join comfortably in conferences. Nevertheless, he was always willing and anxious to give others the benefit of his investigation and was one of the first to realize and advocate the need for research and the value of the chemist and the physicist not only in research work but in the regulation of the process of manufacture and in the utilization of gas.

He was a far seeing administrator and rendered invaluable service to his own Company, and the Gas Industry is richer for his services. Two outstanding steps may be mentioned here. These are the basic price method and the charging for gas on the thermal basis, both introduced by the South Metropolitan Company's Act of 1920. Incidentally, the provision therein for benefit to accrue to the supplier of gas for reduced sulphur content is worthy of emulation. Mention must be made of the part he played in the development of Co-partnership following Livesey's death in 1908. It was born during his period of service with the South Metropolitan Gas Company and was the apple of his eye.

Altogether, Carpenter was a great man. His reserved and at times somewhat cold manner often created a wrong impression, and he did not get the credit he deserved for some of his actions. He had a keen sense of justice, and would often go to fantastic lengths in an endeavour to right a wrong, but appeared to lack that intuitive faculty which stands some other administrators in such good stead, and to trust rather too much to pure reasoning. His many kindnesses and generosity were hidden behind a cold exterior and known only to a few.

From Robert Robertson, President, The Institution of Gas Engineers.

In the passing of Dr. Charles Carpenter the Gas Industry has lost one of its leading personalities who for half a century has exercised a considerable influence on the direction of its affairs and the shaping of its destiny. As the natural successor of the late Sir George Livesey in the Presidency of the South Metropolitan Gas Company, he inherited a great tradition which he was well-qualified to continue and to the end most worthily maintained.

A man of exceptionally keen intellect, lofty ideals, and great originality of thought, he made many notable contributions to the technological and political advancement of the Gas Industry, while in the promotion and fostering of the co-partnership movement his name will ever be associated with the welfare side of industry generally. He was President of the Incorporated Institution of Gas Engineers in 1895 and besides contributing many important Papers and serving in many other capacities, he has always taken a keen interest in the work of The Institution of Gas Engineers.

He was also a man of vision and foresight and his pioneer work in connexion with the elimination of sulphur from town gas, the improvement in design and the standardization of gas burners and appliances, the introduction of the calorific standard for the measurement of gas values, and the "basic price" have secured for him an honourable place in the archives of the Gas Industry with the great men of the past.

His outlook was strongly individualistic and his scorn of compromise prevented him from becoming identified with the post-war form of democratic government adopted by industry generally; but he had the warmest and most generous of natures and was ever ready to place his wide knowledge and experience and his services at the disposal of all who sought it.

His last fight was in the gallant endeavour to secure for the Gas Industry a right which it had for long been denied, and of him it may truly be said "He was a man, take him for all in all, I shall not look upon his like again!"

Personal

Mr. T. MEDCALF has been elected Chairman of the Swindon United Gas Company and all Subsidiary Companies, to fill the vacancy caused by the death of Major F. G. Wright, J.P. Mr. Medcalf joined the Board of Directors of the Company in 1930, and was elected Vice-Chairman in June, 1935, on the death of Mr. Ernest Bishop. Mr. E. W. BEARD has been elected Vice-Chairman.

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We learn that Mr. ROBERT COWIE, Jnr., has been appointed Joint General Manager at Hawick with his father, Mr. R. W. Cowie.

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To meet the demand in the Gas Industry in Germany, the Technische Hochschule, Karlsruhe, has inaugurated a special educational scheme for gas engineering students. In this connexion a new Professorship of Technical Gas Utilization and Industrial Furnace Design has been awarded to Dipl.-Ing. JOHANNES KORTING. At the same time he will continue the management of the department of Gas Utilization at the Gasinstitut, which has been such a well known activity of the German Gas Association for about thirty years.

A Golden Wedding Celebration

Mr. and Mrs. J. Winson Scott

Mr. and Mrs. J. Winson Scott, of Manchester, celebrated their Golden Wedding attended by a large gathering of friends, engineers, staff, and leading workmen at the Reform Hall, Heaton Chapel, on Saturday, Sept. 3. Few men possess a wider circle of friends than the Managing Director of "R. & J. D.," who is assiduous in his attendance at functions of the Gas Industry wherever they are held, and who is loved for his genial personality as much as he is respected for his engineering achievements.

Following the reception and dinner, a social evening was held, and during the proceedings the Rev. George Armitage, Sir Frederick West, and Mr. Alexander Mackay, along with other speakers, made kindly references to the "happy pair." Mr. Armitage claimed to have married them and christened their nine children, and spoke highly of their social work. He also welcomed two of the bridesmaids who were present.

Sir Frederick West made humorous references to the thirty years' contests between Dempsters and Wests, and claimed to be their oldest friend present. Mr. Mackay, who took charge of the social side, made many happy allusions to the stream of telegrams handed to him during the evening. The principal toast was proposed by Mr. Alfred Buckler, a nephew of the late R. A. Hepworth, who was a founder of the firm and for many years the Engineer and General Manager. He paid tribute to Mr. Scott's ability as an engineer, to his original ideas and patents which had a world-wide reputation. Then Mr. Leslie Walker, a nephew of Mr. John Dempster, presented to Mr. and Mrs. Scott an illuminated address, claiming that, although the invitation sent out said "no gifts," an address did not come in that category. He made reference to the high esteem in which both were held not in Manchester alone but equally elsewhere, and wished them many more years of mutual happiness.

Mr. Scott in his reply expressed their joint delight at being surrounded by so many good friends, and thanked the speakers for their kindly remarks which would always be remembered. He said he was the sole survivor of the staff and workmen who were the founders of the firm more than fifty years ago. In the '80's Mr. John Dempster patented a process for the recovery of by-products from blast furnace gases which kept them on full time for many years. Later they purchased the sole rights of the Gadd and Mason gasholder and the fact that he was placed in charge of their erection and supervision enabled him to see where improvements could be made. They adopted the Peebles process, and the Welsbach mantle came along and ruined it, and thereafter other features were exploited that have made the firm famous. Any progress he might have made in his profession he attributed to the tuition and kindly help of the late R. A. Hepworth. Mr. Scott made grateful reference to the way in which he had been supported throughout the 50 years by his wife, whose loving care, help, sympathy, and encouragement he would never be able to repay. He read telegrams from Australia, Canada, and from Mr. Dempster who was away in the far North of Scotland.

Mr. and Mrs. Scott have four children surviving, a daughter, and three sons who all served through the War.

Mr. Scott is a Freemason of over forty years and a Past Provincial Grand Officer of East Lancashire, and a Past Master and Founder of the Northern Star Lodge. He plays golf—but confesses that he has to receive strokes from his wife who is a past lady captain of the Heaton Moor Club. He is a member of The Institution of Gas Engineers and many of the District Associations, and among many greatly appreciated telegrams was one from the President of the parent body.

We have ascertained that his grandfather, Joseph Winson, was the proprietor of the Matlock Gas-Works, and the largest shareholder in others, and that when quite a boy his eldest grandson was made acquainted with the gas-works—when 12 years of age his grandfather had a serious illness and for three months Mr. Scott had sole charge of the works, afterwards studying at the Manners School, Bakewell, and Staveley Grammar School, before being articled.

Forthcoming Engagements

September.

15.—**I.G.E.**—Finance Committee (instead of Sept. 13), 1.45 p.m.; Membership Committee (instead of Sept. 13), 2.15 p.m.; General Purposes Committee, 3 p.m.; Refractory Materials Joint Committee, 3 p.m.
15.—**Midland Juniors.**—Visit to Nottingham to inspect Gas Heated Swimming Pools.
15.—**S.B.G.I.**—Council, 2.30 p.m.
15.—**Wales and Mon. Association.**—General Meeting at Porthcawl.
19.—**Gas Companies' Protection Association.**—Committee meeting at 5, Victoria Street, S.W. 1, 2.30 p.m.
20.—**B.C.G.A.**—Meeting of the Executive Committee, 2.30 p.m.
20.—**I.G.E.**—Gas Education Executive Committee, 2.30 p.m.
22.—**I.G.E.**—Gas-Works Safety Rules Committee, 2.30 p.m.
23.—**I.G.E.**—Joint Lighting Committee, 2.30 p.m.
26.—**L.C.C.A.**—Finance Committee, 10.45 a.m.; Executive Committee, 11.15 a.m.; Central Committee, 2.30 p.m.
28.—**I.G.E.**—Pipes Committee, 2.30 p.m.
30.—**I.G.E.**—Liquor Effluents and Ammonia Committee, 11.15 a.m.; Joint Research Committee, 2.30 p.m.
30.—**Wales and Mon. Juniors.**—Visit to Austin Motor Company, Birmingham.

October.

1-4.—**B.C.G.A.**—**Annual General Meeting and Conference at Brighton (for Programme see p. 34 of "JOURNAL" for July 6).**
6.—**I.G.E.**—Research Executive Committee, 2.30 p.m.
7.—**I.G.E.**—Joint Committee on Complete Gasification Under Pressure (16, Old Queen Street, S.W. 1), 3 p.m.
7.—**North of England Association.**—Autumn Meeting at Sunderland.
7.—**Southern Association (Eastern District).**—Meeting at Gas Industry House, 2.30 p.m. Discussion on A.R.P.
10.—**I.G.E.**—Finance Committee, 1.45 p.m.; Membership Committee, 2.15 p.m.; General Purposes Committee, 3 p.m.; Benevolent Fund Committee of Management, 4.30 p.m.
11.—**I.G.E.**—Council, 10 a.m.
12.—**I.G.E.**—Board of Examiners, 2.30 p.m.
13.—**Midland Association.**—Autumn General Meeting, Grand Hotel, Birmingham.
18.—**I.G.E.**—Gas Education Executive Committee, 11 a.m.; Gas Education Committee, 2.30 p.m.
20.—**Eastern Counties Association.**—Autumn Meeting at Gas Industry House, 2 p.m.
27.—**Coke Oven Managers' Association.**—Annual Dinner, Hotel Victoria, Northumberland Avenue London.

November.

1.—**I.G.E.**—Council, The Institution of Mechanical Engineers, 9.30 a.m.; Council (continued), the Institution of Mechanical Engineers, 4.30 p.m.
1-2.—**I.G.E.**—10th AUTUMN RESEARCH MEETING at the Institution of Mechanical Engineers, Storey's Gate, St. James's Park, London, S.W. 1.

News of the Week

The Kitchens of the new Hearts of Oak Benefit Society's convalescent home at Callis Court, Broadstairs, have been equipped with gas for cooking.

A New Showroom is being erected by the Glasgow Gas Department at 7, Dumbarton Road, Clydebank. The premises will be officially opened in a few weeks and will have two windows, the frontage being surmounted with a canopy.

Application for a Special Order, under the Gas Undertakings Acts, 1920 to 1934, is intended to be made to the Board of Trade by the Mansfield Corporation with the object *inter alia* of extending the limits within which they are at present authorized to supply gas.

During August the Glasgow Gas Department supplied 8,140,000 cu.ft. of gas to buildings at the Empire Exhibition, Bellahouston Park, making a total of 31,490,000 cu.ft. since the opening of the Exhibition. Under the supervision of Mr. John McIsaac, of the Gas Department Staff, the Gas Pavilion and the *Evening News* Pavilion are being floodlit nightly.

We Have Received from the Technological Institute of Great Britain a copy of a Souvenir Book which commemorates the Coming-of-Age of the Institute. This Souvenir Book, together with the T.I.G.B. Prospectus "The Engineer's Guide to Success," which contains particulars of over 200 correspondence courses in engineering and allied technology, will be issued free to any of our readers on application to The Technological Institute of Great Britain, Temple Bar House, London, E.C. 4.

Several Hundreds of the Nation's Leading Scientists, including prominent research workers in every field and representatives of industries ranging from food, plastics, and distillation to roads and building, will travel to Glasgow next week to take part in a symposium on "The Trend of Progress—Where are we Heading?" The symposium, which has been arranged by the Society of Chemical Industry as a section of the Society's Autumn Meeting from Sept. 16 to 20, will take place in the Concert Hall of the Empire Exhibition. Other functions during the meeting include an official dinner, at which a film of the Society's annual meeting in Canada earlier this year will be shown, and a reception in the Palace of Arts by the Rt. Hon. the Earl of Elgin, K.T., President of the Empire Exhibition Committee.

A Good Deal of Prominence has been given, even in the national Press, to the fact that the little Cornish town of Callington has returned to gas for public lighting after 14 years' experience of electricity. The change, which was made on Sept. 1, is a result of the decision of the Council to accept the tender of the Callington Gas Company in preference to that submitted by the Cornwall Electric Power Company. When the town was last lit by gas 14 years ago there were 40 public lamps, the lighting and extinguishing of which was done by a lamplighter. The number of lamps has now been increased to 96, and an automatic control system is in force. When electric lighting was introduced a number of the old gas standards were allowed to remain on their original sites and these are now being utilized. The lighting of Callington by gas is to continue under a contract period of seven years.

A Pamphlet, "The Factories Act, 1937—Safety Tables and Memoranda," has been issued by the National "Safety First" Association, Terminal House, 52, Grosvenor Gardens, S.W. 1. This is the result of efforts made by the Association to provide factory occupiers, who are naturally much concerned with the new Act, with a ready means of ensuring themselves that their existing plant and procedure complies with the new safety requirements. To make this possible a series of short questions was compiled, covering the whole Act and for use in a general review of the safety sections, and also detailed tabular statements were prepared dealing with the more complex sections such as those affecting the fencing of guards, hoists, and steam boilers. The resultant matter was originally published in a special issue of the Association's Industrial Safety Bulletin, and so many requests for additional copies were received that it was decided to issue a reprint in a form suitable for distribution to individual managers, engineers, foremen and others specially concerned. These may be obtained, price 4d. each, 2s. 6d. per dozen, 10s. for 50, and £1 for 100, all post free.

New Showrooms at Tranent were formally opened last week by Provost Lindores.

Cookery Demonstrations are now being given at the Dundee Gas Department showrooms twice daily by Miss M. K. Gompertz, M.C.A., of Messrs. R. & A. Main, Ltd.

A New Gasholder at Millport was formally inaugurated on Sept. 9 by Dr. J. H. Paul, Convener of the Millport Town Council Gas Committee. During the past few years numerous improvements have been effected at the Millport Works.

A Gala Week with a pageant and procession is to be held by the Burgh of Clydebank on Oct. 1. The Glasgow Corporation Gas Department is to co-operate in the pageant with the setting off of balloons and decorated vans belonging to the Department will take part in the procession.

The Physical Society Announces that the tenth annual Craftsmanship and Draughtsmanship Competition will be held as usual in conjunction with its annual exhibition of scientific instruments and apparatus in January next. Competitors must be in the regular employ of a firm or institution which will be exhibiting or has exhibited at least once during the previous three years, and which has been invited by the organizing committee to enter its employees for the competition.

The Complete Reports of Individual Sessions at the World Power Conference recently held in Vienna will consist of about eight volumes comprising approximately 4,000 pages in all. There will be about 193 Reports. Each of the five sections fixed by the agenda will be supplemented by a general report in German, English, and French. A list of meetings and an index will conclude this comprehensive work. Its abundant contents will be of interest to everyone who has to deal with the economics of power supply. The advance rate of subscription for the complete work is approximately RM125.

The Abolition of Dover Coal Dues is a question which is likely to be raised again. Commenting on this in his issue of Sept. 9, the editor of the *Dover Express* points out that his paper has always regarded the local coal dues as an unfair tax on local industry. Electricity coming by the grid, he states, pays nothing in local coal dues whereas the Gas Company pays 1s. 7d. per ton, the equivalent of over 1d. per 1,000 cu.ft. of gas sold. When the Corporation Transport Bill was before Parliament some time ago an attempt was made to have a clause inserted providing for the abolition of Dover's coal dues, but it was looked upon as being outside the true scope of the Bill, and was dropped. It is suggested that the Gas Company may be considering the promotion of a Private Bill to secure their object.

Among the Prizewinners at the Taunton Hospitals Carnival was the Taunton Gas Company, who secured a "first" in the class for trade turn-outs with an entry entitled "The Romance of a Lump of Coal." This presented a series of vivid pictures illustrating coal and its many by-products. In the humorous tableaux class members of the Taunton Gas Company Sports Club won first prize with an amusing skit entitled "Taunton Flower Show, 1948," while the Company itself secured second award. The latter's entry consisted of two pictures illustrating the transformation which has taken place in methods of cooking and heating since the days of King Alfred. The first picture showed King Alfred in a primitive dwelling and the cakes being burnt over a peat fire, while the second picture was that of a housewife in a kitchen equipped with modern gas appliances.

Gas Referees: An Announcement

The Gas Referees will leave their present premises at 66, Victoria Street, S.W. 1, on Sept. 29, after which date their address will be Chapter Street House, 26, Chapter Street, S.W. 1, the telephone number being Victoria 7032. Except in respect of his duties as one of the Gas Referees, Mr. W. J. A. Butterfield's address will continue to be 66, Victoria Street. The duties of the Referees will be transferred to the Board of Trade on Jan. 1, 1939, and from that date all communications relating to those duties should be addressed to The Board of Trade (Gas Testing Section) at Chapter Street House.

The 27th National Conference of the B.C.G.A.

Programme of Brighton Meeting

The 27th National Conference of the British Commercial Gas Association will be held at Brighton from Oct. 1 to 4—under the Presidency of Mr. A. M. PADDON, M.Inst.C.E. The Royal Pavilion has been placed at the disposal of the Conference by the Brighton Corporation, and the following Official Programme is announced:

Saturday, Oct. 1.

At Home—

3. o p.m. to 5.30 p.m. — The President and Mrs. A. M. Paddon will be At Home to Delegates and their Ladies at The Dome, Brighton. (Entrance through Royal Pavilion Grounds.)

Reception—

8. o p.m. to 8.30 p.m. — Reception at the Royal Pavilion of Delegates and Ladies by the Mayor of Brighton (Ald. H. Hone, J.P.), followed by cards, music, and dancing till midnight.

Sunday, Oct. 2.

Golf—

By courtesy of the Club Committees, Conference Delegates and their Ladies will be cordially welcomed to play on the following courses:

*Brighton and Hove Golf Club.
*Dyke Golf Club.
*East Brighton Golf Club.
West Hove Golf Club.

* Reduced Green Fees.

NOTE.—Members are asked to produce their signed Conference identification cards to the Club Secretaries

Glyndebourne Opera House—

1.45 p.m. for 2. o p.m. prompt — Visit of Delegates and Ladies to the Glyndebourne Opera House at the invitation of the Brighton Hove and Worthing Gas Company.

NOTE.—The Glyndebourne Opera House, which is directed by the Glyndebourne Society, is situated in the grounds of the estate at Lewes of Mr John Christie, who has generously placed facilities for the privilege of this visit at the disposal of the Conference.

Coaches will leave the Royal Pavilion at 2.o p.m. and the return journey will be made at 6.o p.m., arriving in Brighton at 6.45.

A Concert will be given at the Opera House, where tea will be served.

9. o p.m. — At The Dome, Brighton. Premiere performance of the new season's programme of Gas Industry Films, to which Ladies are invited.

Films dealing with diet, cooking, and space heating will be shown. There will be a musical film featuring Henry Hall and his Band and a film describing the hundred years' service which the Industry has given to the public. In view of its importance to the Smoke Abatement Campaign, the film entitled "Smoke Menace" will again be included in the programme. All these films—and others—will be available for use by members during the coming season.

The performance will be preceded by Organ Music.

Monday, Oct. 3.

First Business Session—

10. o a.m. — At The Royal Pavilion, Music Room.

Welcome to Delegates by The Worshipful The Mayor of Brighton, Alderman Herbert Hone, J.P.

(In Private Session.)

Twenty-Seventh Annual General Meeting.

Presentation of Annual Report by the Chairman of the Executive Committee, Mr. W. J. Sandeman, J.P.

Presentation of Annual Accounts by the Hon. Treasurer, Mr. T. P. Ridley, F.C.I.S.

(In Open Session.)

Presidential Address by Mr. A. M. Paddon, M.Inst.C.E., President of the Association and Chairman of the Brighton Hove and Worthing Gas Company.

Address by Mr. S. C. Leslie (Publicity Manager of the Gas Light and Coke Company and Chairman of the Association's Publicity Sub-Committee), introducing the Association's forthcoming Smoke Abatement Campaign, followed by discussion.

Luncheon—

12.45 p.m. for 1. o p.m. — In the Corn Exchange—Church Street Entrance. Official Luncheon for Delegates and Ladies.

Second Business Session—

2.45 p.m. — At The Royal Pavilion—Music Room.

Address by the Rt. Hon. Herbert Morrison, P.C., M.P., to be followed by discussion

(In Private Session.)

4. o p.m. — Adjournment for tea in Banqueting Room of The Royal Pavilion, and discussion on the Association's activities.

Banquet—

7.15 p.m. for 7.45 p.m. — At the Dome, Brighton.

Banquet to the Conference Delegates by the Chairman and Directors of the Brighton Hove and Worthing Gas Company.

For Ladies—

2.15 p.m. for 2.30 p.m. — Tour: "Glimpses of Sussex Downland and Weald" arranged for Ladies by invitation of the Brighton Hove and Worthing Gas Company. Coaches will leave The Royal Pavilion at 2 30 p.m. prompt. Tea will be served at East Grinstead, and Brighton will be reached on return journey at 6.15 p.m.

For Ladies—

8. o p.m. to 8.30 p.m. — At The Royal Pavilion.

Reception for Ladies by Mrs. Clowes, M.B.E., to Conversazione given by the Brighton and Hove Branch of the Women's Gas Council.

Entertainment and refreshments will be provided for guests.

10. o p.m. to Midnight — The Conversazione for Ladies and Banquet for Conference Delegates will be followed by dancing in The Royal Pavilion from approximately 10 o p.m. until midnight.

Tuesday, Oct. 4.

Third Business Session—

10 30 a.m. — In The Royal Pavilion, Music Room.

Address by Lord Horder, K.C.V.O., M.D., B.Sc., Hon.D.C.L., F.R.C.P.

Followed by discussion opened by Dr. Duncan Forbes, M.B.E., B.Sc., D.P.H., Medical Officer of Health, Brighton.

Luncheon—

12.45 p.m. for 1. o p.m. — In the Corn Exchange, Church Street Entrance.

Luncheon by the President and Members to the retiring President and to the Directors of the Brighton Hove and Worthing Gas Company.

Visits—

2.45 p.m. for 3. o p.m. — Visits—by kind invitation—for Conference Delegates and Ladies to the Works of:—

(1) H. J. Green & Co., Ltd., Foodstuffs and Table Delicacies Manufacturers, Hove.
Coaches will leave The Royal Pavilion at 3 o p.m. prompt, arriving back in Brighton at 5 p.m.

or

(2) The Diaphragm and General Leather Co., Portslade.
Coaches leave, &c., as above, at 3.o p.m. Brighton 5 p.m. approximately

or

(3) The Littlehampton Showrooms of the Brighton Hove and Worthing Gas Company.
Coaches leave, &c., 3 p.m. Brighton, 6 p.m.
Tea will be served on each of the visits.

NOTES.

The Portslade Works of the Brighton Hove and Worthing Gas Company will be open to the inspection of delegates during the Conference.

The exhibition of B.C.G.A. work and services is held in the first floor Conference room of The Royal Pavilion. Staff are in attendance daily.

A separate programme is issued of events arranged for ladies, who will be able to obtain information and assistance regarding all Conference and other local arrangements from the Ladies' Information Bureau in The Royal Pavilion.

All gratuities to staff engaged in functions included in the programme have been provided for, and the Association has been particularly requested to bring this to the notice of members.

Juniors at the Empire Exhibition

Members of the British Junior Gas Association Joint Council visited the Empire Exhibition, Glasgow, on Sept. 10, the company including representatives from the London, Manchester, Western, Yorkshire, and Scottish Associations. In the forenoon an inspection was made of the Industrial Gas Exhibits in the Palace of Engineering and a tour of the Exhibition was made thereafter. Lunch was taken in the Concert Hall Restaurant and a visit was then made to the Gas Pavilion, where a brief speech of welcome was made by Mr. W. R. Drummond, Secretary in Scotland of the National Gas Organizations, who afterwards entertained the company at tea in the Garden Club. In the evening dinner was taken in the Concert Hall Restaurant, when Mr. S. C. Waldock (Gas Light and Coke Company, President of the London and Southern District Juniors) voiced the thanks of the company to Mr. W. R. Drummond for his hospitality and referred with appreciation to the various exhibits.

On the following day a tour of the Five Lochs was undertaken, good weather prevailing. All the arrangements for the visit were made by Mr. Alexander Bujnowski, Glasgow, Secretary of the Council.

Theory of Industrial Gas Heating*

Reviewed by E. V. Evans

For those whose ambition it is to scale the highest peaks of the world the compression of the theory of industrial heating by gas into a little book of 171 pages is probably a minor endeavour. But for those content to walk on less elevated paths the undertaking would be an immense one.

Mr. Peter Lloyd has succeeded in presenting a clear picture of the subject of industrial gas heating and his book should serve a very useful purpose in the instruction and training of industrial gas salesmen.

A book on the theory of heating by gaseous fuel must either be simple and confined to a clear exposition of that which is well established, or it must seek to weigh and judge between the rival theories and formulæ which have been suggested in explanation of the phenomena of gaseous combustion and their application in practice. Generally this book is one of the first type, but from time to time the reader is introduced to some of the contentious matter. In the second chapter, for example, he is allowed to become involved in a discussion of actual and theoretical flame temperatures and the various experimental methods used for measuring the former.

Nomograms and formulæ are interspersed throughout the book and in such a treatise this, of course, must be, although it is often dangerous to present a nomogram or empirical formula for the use of those who do not understand the derivation or limitation of such aids to mental processes. There is always a risk that they may be used as a species of charm or incantation which will solve a problem without the need for the problem to be fully comprehended.

In the third chapter we visit the perilous peaks of the peroxide theory and the hydroxylation theory of the combustion of hydrocarbons, and the almost equally difficult regions of ignition temperatures and flame speeds. The succeeding pages deal largely with the measures to be taken for solving practical difficulties, and again impressive formulæ and curves are presented which serve to remind the reader that there is much theory behind the practice.

This is a small book full of most useful information and it should commend itself to those concerned with the promotion of our industrial business.

* Second Edition. By Peter Lloyd, B.A. (Cantab.), A.I.C., M.Inst.Gas E. Published by Walter King, Ltd., London. Price, 7s. 6d.

United Kingdom Gas Corporation

In the form of a brochure, of which they have been good enough to send us a copy, the United Kingdom Gas Corporation, Ltd., have issued the following statement:

Two recent announcements, to wit, the promotion of the West Yorkshire Gas Distribution Bill which, after examination by the Committees of both Houses of Parliament, received the Royal Assent on Friday, July 29, and the formation of the Hemsworth and United Kingdom Coke Oven Company, have focused attention upon the United Kingdom Gas Corporation, Ltd., whose name has been associated with both these matters.

It will be remembered that the United Kingdom Gas Corporation, Ltd., was formed in the year 1935, and it has acquired 54 gas and water undertakings in England and Wales, and through its control of the Caledonian Gas Corporation, 19 undertakings in Scotland. Its share and loan capital now amounts to some £4,700,000.

The undertakings that have been purchased are situated in well-defined areas, and it is the policy of the Corporation to amalgamate and link them together where economies in operation will result, and in any circumstances to co-ordinate them and re-organize them in accordance with the most modern practice, with a view to reduction of overhead expenses. No less than nine of the acquired undertakings have been so amalgamated by Acts of Parliament or Board of Trade Orders during the past twelve months. By these means the controlled undertakings are being enabled to produce and sell *gas fuels* at prices to compete with any other source of power and heat.

In Yorkshire twenty of the controlled undertakings are situated in the highly-industrialized area of the West Riding, and it is in connexion with what is the most comprehensive scheme of gas distribution that has ever been attempted in this country that the West Yorkshire Gas Distribution Bill has been approved by both Houses of Parliament. The Bill was strenuously opposed by various local authorities owning gas undertakings and by the West Riding County Council.

In the area there is available for purchase a considerable amount of surplus gas from coke ovens estimated at 13,617,000 cu.ft. per day, while there is a potential production of more than twice this quantity. The coke oven gas now available is in the main utilized in an uneconomic fashion as fuel in the various works where it is produced, a quantity actually being blown to waste. The United Kingdom Gas Corporation, Ltd., was able to show that there is already existing a demand from industry for some 10 million cu.ft. per day, and it is estimated that there exists a potential demand for much greater quantities.

The West Yorkshire Gas Distribution Bill was therefore promoted for the purpose of forming a Statutory Company, having power to lay mains throughout the area in which the group of companies above referred to is situated, to purchase coke oven gas, where available, and to provide supplies from large gas-making plant most conveniently situated for coal supplies and gas distribution.

This Company, the whole of whose Ordinary Share Capital will be subscribed by the Corporation, will operate with a view to balancing the diverse sources of supply with the demands of the Companies controlled by the Corporation and so put each individual Company on the same footing in the matter of meeting demand and selling price, as it would be were it a part of a single large Company of the size equal to all the Companies collected together.

The smallest undertaking will thereby be enabled to contract to supply gas to large industrial users in quantities and at prices which would be quite impossible for it to supply as an independent manufacturing unit.

The situation was well summarized by Mr. Sydney Turner, K.C., opposing the Bill before the House of Commons Committee on behalf of the West Riding County Council, who when cross-examining Colonel Carr, the Managing Director of the United Kingdom Gas Corporation, said:

"You will be glad to hear that not only am I not opposing on preamble but I am going to give you full credit for a new and excellent idea in the Gas Industry. This is the first time, is it not, that anybody has ever thought of the formation of a Company in the Gas Industry for the sole purpose of collecting gas and laying the network of mains to supply that gas to statutory undertakers?

"And like all good ideas, in its essence it is simple, and you will not be offended if I say that perhaps it is a wonder that nobody has ever thought of such a good idea before?"

The County Councils opposed the Bill in order to obtain protective clauses in respect of the use of roads, the principal clause stipulating that, if ever it should become necessary, for road-widening or other reasons, to alter the position of the proposed mains, the expense should fall upon the Company. This condition was quite unacceptable to the promoters of the Bill, and their view prevailed with the Committee of the House of Commons, who decided that in the event of road alterations necessitating a removal of mains the expenses should be borne by the Local Authorities.

The dividend payable on the Ordinary Share Capital of the West Yorkshire Gas Distribution Company is limited to 10%, but if in any one year such 10% is not earned the deficiency may be made up in succeeding years.

So much for the West Yorkshire Gas Distribution Bill, a pioneer effort from which most interesting results may be expected.

The Hemsworth and United Kingdom Coke Oven Company will be one of the units supplying gas into the mains as described above. The United Kingdom Gas Corporation have a 40% interest in this Company, which will operate in the following manner: The Hemsworth Colliery Company will be responsible for the supply of coal into the ovens at a price fixed by contract to cover a long period of years. The gas will be purchased also at a contract price for a similar period and will be purified and introduced into the mains of the West Yorkshire Gas Distribution Company, which, as described above, will dispose of it to the Companies controlled by the United Kingdom Gas Corporation.

The coke resulting from this operation will be specially prepared as domestic smokeless fuel and will be sold on a commission basis by the Gas Undertakings controlled by the United Kingdom Gas Corporation throughout the district. In effect, instead of distributing heavy coals over varying distances and carbonizing in a large number of relatively small gas manufacturing units, gas will be produced at pithead and the comparatively light coke will be distributed to the various works for consumption, domestic and otherwise.

This comprehensive and progressive scheme should result in economy to the consumer, economy to the individual company, and, in the long run, enhanced revenue to the United Kingdom Gas Corporation through whose enterprise it has been brought into being.

The North British Association of Gas Managers

The 77th Annual General Meeting of the North British Association of Gas Managers was held in the Picture House, Largs, on Sept. 8, when Mr. GEORGE BRAIDWOOD, the President, occupied the chair.

The PRESIDENT expressed his pleasure at seeing so many present. They had with them Provost Lindsay and magistrates of Largs. The Provost would give them a formal welcome to the town.

Provost JOHN LINDSAY said that when it was first intimated at a meeting of Largs Town Council that the North British Association of Gas Managers proposed to hold its conference in Largs, it was agreed that they should do all in their power to help on its success. The Council were deeply grateful for the help and advice Mr. Braidwood gave them in the erection of their new vertical retorts. There may be people, said Provost Lindsay, who thought this was an age of electricity, but the majority would agree that the cry was for gas and still more gas. They had gone a long way since the Burgh Supply Act of 1876, and if they continued in their good work they would bring home to the people the fact that gas was essential for modern needs. It was through conferences such as this that such knowledge could be imparted. On behalf of the Town Council and citizens of Largs he gave them a very hearty welcome and trusted their stay would be both profitable and pleasant.

Sir Frederick West and Mr. J. E. Blundell relax after their strenuous efforts at the meeting.

The PRESIDENT thanked the Provost for his kindly welcome. They had received no half-hearted invitation to Largs. He knew the utmost would be done to make their visit happy and pleasant. Largs had every kind of facility. It had hotels, boating, golf, fine scenery—and the Largs people were as fine as their surroundings. He thanked the Provost for his personal references. Evidently also Provost Lindsay knew something about the Gas Industry. They had indeed gone a long way since 1876. The public thought some years ago that there was nothing like electricity. But they had now entered into a gas era, which meant prosperity for all concerned. They had a splendid gas-works at Largs, and he was proud to have been associated with it. He congratulated the Council on the development of their town. If any members of the Association were due for retirement they could settle in no better or more beautiful place.

Retirement of Mr. Kellock.

The President intimated that Mr. A. Kellock (Airdrie) was retiring from the Secretaryship of the Association which he had held for ten years. He would ask him on this occasion to read the minutes, generally taken as read, as this would be his last opportunity of doing so.

Mr. Braidwood made reference to two members who had passed away since their last meeting. Mr. Robert Gray, who died suddenly in London on June 3, 1938, became an Associate Member in 1926. He began his career in the gas-works of his native town of Kirkintilloch. He was assistant at Hamilton, Greenock, and Kingston-on-Thames, and his appointment as Chief Engineer of the Newcastle-upon-Tyne and Gateshead Gas Company was announced early in the year. In his short service there he had endeared himself to the Board and officials of that Company and was greatly esteemed by the employees. His sudden demise at the opening of a most promising career came as a shock to his many friends and was deplored by all. Mr. Alexander T. Gray, of Glasgow, had been an extraordinary member since 1918. Sole partner of the Birkenshaw Coal Company, he had dealings with many gas undertakings throughout Scotland. His death on April 22 last was regretted by a wide circle of friends.

Apologies were intimated from Presidents and Secretaries of kindred organizations and from various members of the Association. The Chairman also intimated that Mr. A. S. Leggat (Chairman of the Coatbridge Gas Company) was unable to be present, but sent his good wishes. Mr. Leggat had been associated with the Company all the time he (Mr. Braidwood) had been connected with it.

The President said it was his pleasant duty to welcome to their meeting Mr. Murray, the sole representative of the Coatbridge Gas Company. Sir Frederick J. West was also with them, and he required no introduction. He was an outstanding figure in the Industry, Vice-President of The Institution of Gas Engineers, Chairman of the Manchester Ship Canal Company, and associated with many other concerns. They also had Colonel W. M. Carr, a Past-President of the Institution, and Dr. W. T. K. Braunholtz, the Secretary. Mr. W. D. Rowe was well known to them all, and last, but not least, they had Mr. Robert Robertson, President of The Institution of Gas Engineers. When they heard Mr. Robertson speak they would know that he was a Scotsman, and he was all the more welcome for that reason.

Mr. ROBERTSON said he was delighted to be present to support their President. On behalf of the Institution he offered his heartiest greetings and best wishes for the continued success and prosperity of the Association. These greetings were couched in respectful language, for the Institution was junior to their Association, and he had in mind the respect that age demanded from youth. [Laughter.] The Institution had to undertake certain duties that could be discharged only by a national body, but the District Associations had great responsibilities, and the North British Association had indicated that it was able to look after its own job. On behalf of the visitors he thanked the President for his words of welcome.

The Financial Statement and Report were taken as read and adopted.

New Members.

It was intimated that the following had been elected to membership:

Ordinary Members.—C. D. M. Campbell (Caledonian Gas Corporation, Ltd.); W. Kirk (Motherwell); H. S. Milne (Aberdeen); A. C. Wilson (Lerwick).

Extraordinary Members.—G. H. Elliott (Sheffield); J. Riddell (Glasgow); D. M. Robinson (Liverpool); W. McFarlane (Paisley).

The New Vice-President.

The PRESIDENT said they would observe from the report that Mr. Alexander McDonald (now of Castleford, Yorkshire) had intimated his resignation as Junior Vice-President. This the Council had accepted with regret and had conveyed to him their congratulations and best wishes for his future. At the same meeting of Council their Secretary, Mr. Kellock, had announced his intention of retiring in June next. He had been Secretary and Treasurer for ten years and had carried out his duties to the satisfaction of all. Faced with two retirements, the Council had asked Mr. Kellock to accept the vacant Vice-Presidency, and in accordance with their powers under rule 37 of the Constitution they had appointed him to that office and he had accepted. In making this appointment the Council felt that Mr. Kellock's many activities and faithful service could be fittingly recognized by the Association if he ultimately became President. Between now and next June the Council would consider the appointment of a Secretary, who would take up duty on July 1, 1939.

The PRESIDENT presented certificates to successful candidates in the Gas Engineering and Gas Supply Examinations.

Thereafter Sir Frederick J. West presented his William Young Memorial Lecture, which will be found on other pages of this issue.

Death of Dr. Carpenter.

The PRESIDENT intimated that he had just received word of the death of Dr. Charles Carpenter, of the South Metropolitan Gas Company. He was a man of outstanding merit, with ideas of his own which he was not afraid to put into practice. He was an advocate of high quality gas, and conducted his undertaking with great success. He asked the members to be upstanding in his memory.

Luncheon.

An adjournment was made for the group photo, and thereafter Mr. Braidwood and the Directors of the Coatbridge Gas Company entertained members and friends to lunch.

Proposing the toast of the President, Colonel W. M. CARR said he was not actually a member of the Association till the scrutineers reported that afternoon. It was a welcome privilege to give this toast. It was an informal gathering, and therefore he would tell them very little about Mr. Braidwood. Their President had always been a tremendous worker in the Gas Industry, and not only had given of his best, but had turned out many first-class men trained under him. He could pay him no higher compliment than that. Every short leet seemed to have on it a number who claimed to have been trained at Coatbridge. Mr. Braidwood and his Directors had given them an excellent lunch. He thanked them for their hospitality, and wished long life and happiness to Mr. Braidwood.

Replying, Mr. BRAIDWOOD remarked that he did not deserve all the things that had been said about him. He suspected the purpose of Colonel Carr's Scottish visit. He was like the English football club scouts, and he was just a little afraid that he was looking for talent! [Laughter.] If he himself had worked hard for the Gas Industry, it was not through any merit, but simply because he could not help it. He was glad to have them as guests of himself and his Board.

The meeting was resumed in the afternoon, when Mr. J. E. Blundell delivered his Paper. This, together with the discussion which followed, will be dealt with in a subsequent issue of the "JOURNAL."

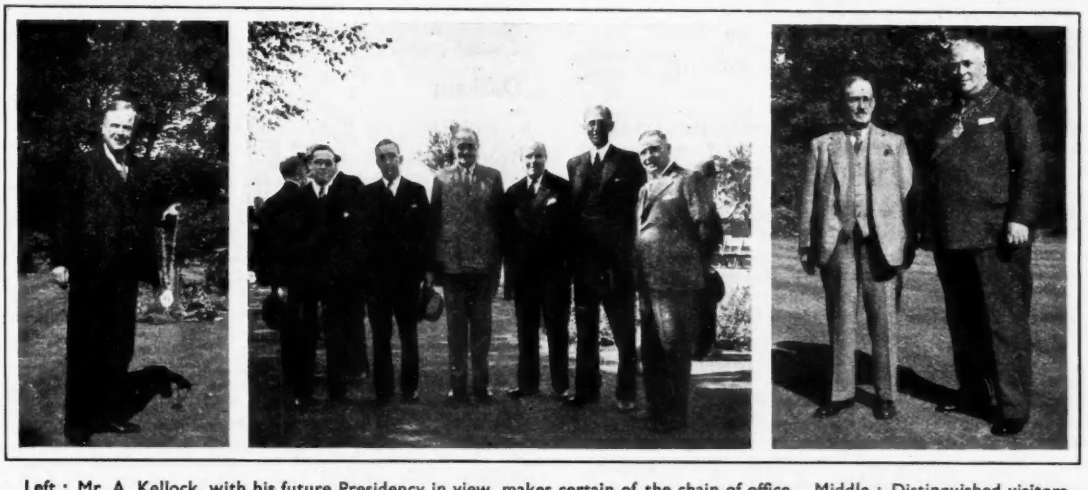
Office-Bearers.

The PRESIDENT intimated that the office-bearers for the ensuing session were as follows:

President.—H. A. Aitken (Leven).
Senior Vice-President.—A. Kellock (Airdrie).
Junior Vice-President.—R. D. Keillor (Greenock).
Elected Members of Council.—A. Jamieson (Johnstone) and D. D. Melvin (Edinburgh).

Mr. H. A. AITKEN, the newly-elected President, thanking the members for the honour conferred upon him, said he realized the great responsibility attaching to the office. He was conscious of his own limitations and ventured to undertake the task with some measure of trepidation. Mr. Braidwood had set a very high standard. During his period of office it would be his endeavour to maintain its high traditions. He had been instructed by the Buckhaven and Leven

Miss Braidwood, who acted so charmingly as hostess, is here seen with (on her left) the President and his son.



Left : Mr. A. Kellock, with his future Presidency in view, makes certain of the chain of office. Middle : Distinguished visitors included : Messrs. D. Lawson, W. R. Drummond, R. Robertson, W. D. Rowe, W. T. K. Braunholtz, Ph.D., and A. Bujnowski. Right : The President with his co-Director, Mr. P. S. Murray.

Commissioners to intimate that the Association would be welcome at Leven for their Spring Meeting, while Mr. Bruce had indicated that he would be glad if they held the Autumn Meeting at St. Andrews.

Presentation of Memento.

Mr. J. JAMIESON (Edinburgh), presenting a memento of office to the retiring President, said that another milestone in the history of their Association had been passed and another name was about to be added to the list of Past-Presidents. Had Mr. Braidwood chosen, he could have held office earlier in his career and the distinction of handing over this badge of office would have fallen to someone other than himself. He regarded this duty as one of his greatest privileges. He had known Mr. Braidwood for many years. He had courage and industry and had confidence in the future of gas. His Directors had paid him a fine tribute when recently they elected him to their Board. Much was expected of him when he was elected President, and he had not disappointed them. He congratulated Mr. Braidwood on the way in which he had carried out his duties, and in handing over the badge expressed the hope that he would be long spared to look back on what had been a creditable and distinguished performance.

In acknowledgment, Mr. BRAIDWOOD said he had enjoyed his position as President. The Council and Mr. Kellock had done the work and he had sat back and enjoyed himself. The duties at first had seemed alarming, but after he had started he found everything very pleasant.

Votes of Thanks.

Mr. J. BELL (Dumbarton) proposed a vote of thanks to the scrutineers, readers of Papers, the President, Secretary, and Council; to Bailie J. Robertson (Largs), the proprietor of the Picture House for the use of the premises for their meeting; to the Provost, Magistrates, and Council of Largs for the freedom of the Golf Course and Putting Greens and parking facilities for cars; and to the Chairman and Directors of Coatbridge Gas Company for their hospitality.

On behalf of the Coatbridge Gas Company, Mr. Miller replied, Mr. Kellock responding for the office-bearers.

In the evening a Reception was held in Moorings Ballroom by Directors of Coatbridge Gas Company.

Golf Scores.

Arthur Cuthbert, Stirling, won Challenge Bowl and Memento—71 (6).

HANDICAP PRIZES.

1st . . . . . W. C. Campbell, Galashiels, 74 (8).
2nd } . . . . James Brock, Glasgow, 75 (scratch).
3rd } . . . . R. B. Waddell, Polmont, 75 (6).
4th . . . . . R. Stewart, Auchterarder, 76 (2).
5th . . . . . David Fulton, Helensburgh 77 (10).

SECTION II.

(Handicaps over 10.)

1st . . . . . A. W. Farquhar, Fraserburgh, 72 (18).
2nd . . . . . J. D. Couper, Glasgow, 78 (13).
3rd } . . . . H. G. Keillor, Buckie, 79 (16).
4th } . . . . A. Jamieson, Johnstone, 79 (11).
5th . . . . . T. S. Lockhart, Rothesay, 79 (18).

Bowling Club.

The Annual Meeting of the North British Association of Gas Managers' Bowling Club was held at the Largs Bowling Club on the Wednesday. Five rinks took part in the competition.

Miss Braidwood, daughter of the President of the North British Association, presented the Trophy and prizes to the following winners: Skip, R. J. Philp (North Berwick); Lead, W. Balfour (Kirkcudbright); Second, T. Royden (Uddington); Third, J. Wood; who were 13 shots up.

Two rinks were 11 shots up, and after playing an extra end the second prizes were presented to: Skip, T. W. Harper (Ayr); Lead, W. H. Handley; Second, D. M. Macintyre (Montrose); Third, R. A. Harvey (Lockerbie).

Third prizes were presented to: Skip, Wm. Young (Stranmer); Lead, K. Mackay (Oban); Second, A. R. Anderson (Alexandria); Third, J. Buchannan.

Mr. Wm. Mann (Stevenston), President of the Bowling Club, expressed his thanks to Miss Braidwood for so kindly presenting the prizes.

At the Annual General Meeting held in the Bowling Clubhouse Mr. J. S. McGill (Slamannan) was elected President of the Club for the ensuing year.

The attendance at the Meeting was excellent throughout, the business sessions being crowded in forenoon and afternoon. On the social side records were broken, there being no fewer than 267 acceptances for the Reception, 212 for the excursion, and 100 for the Ladies' Drive arranged for the Thursday afternoon by the Town Council of Largs.

The reception was a great success, and all were indebted to the Coatbridge Gas Company, whose Board were represented by Mr. Peter S. Murray, Mr. Robert Denholm, and the President, for the entertainment on so lavish a scale. During the evening a display of Highland Dancing was given by Miss Winnie Mann, daughter of the Gas Engineer of Stevenston. Occasion was also taken by Miss Braidwood to present the prizes won by the Ladies' Golf Circle playing on the Hills Hotel Golf Course. The Silver Salver given by Mr. Handley, Managing Director of Messrs. Robert Dempster & Sons, of Elland, was won by Miss W. C. Campbell; prizes for the best scratch score went to Mrs. J. W. MacLusky and Miss Handley; and an award for a hidden hole was won by Miss Ritchie.

Miss Braidwood discharged the duties of hostess throughout to the admiration of all—from her "at home" at the Bowling Green on Wednesday to the break-up of a memorable meeting at Largs Pier on Friday evening.

Gas Undertakings' Results

Motherwell and Wishaw.

The report upon the operations of the Burgh of Motherwell and Wishaw Gas Department for the year ended May 15 states that the use of gas for industrial purposes has further increased, until it has reached almost 30% of the output. Indications point to even this figure being improved upon. At the same time, the increasing popularity of gas in the domestic field is clearly demonstrated by the growing output of appliances of all descriptions. The total gas sold during the year was 391,185,300 cu.ft., being an increase of about 8½% over the previous year. The working figures show a production of 79·92 therms per ton, as compared with 75·69 therms in the previous year. There are 3,589 ordinary consumers and 12,554 prepayment; the average consumption being 24,232 cu.ft. Prepayment consumers took 56·57% of the gas sold and ordinary consumers 13·57%. Consumers continue to make increasing use of the showrooms. The net profit of £1,652 is carried forward. It has been a year of particular activity within the works. Messrs. Clapham Bros., Ltd., completed the new 1½ million cu.ft. condensers, while West's Gas Improvement Company, Ltd., have also completed a new carbonizing plant consisting of three beds of four retorts of a capacity of 1 million cu.ft. per day. The Bryan-Donkin Company, Ltd., have installed exhausting plant of a capacity of 100,000 cu.ft. per hour, while a start has been made with a Connersville meter, of similar capacity, to be provided by Messrs. W. C. Holmes & Co., Ltd. The installation of a Peebles governor on the high-pressure Wishaw main is another piece of work which has been completed. The average price of gas per therm is the lowest on record.

Oldham.

When referring in last week's issue of the "JOURNAL" to the operations during the past year of the Oldham Corporation Gas-Works it was stated that there had been an increase during the year to March last of 72 in the number of public street lamps of the incandescent type—to 4,188 within the borough and 2,410 in the out-townships. The Street Lighting Department report shows that the Department are responsible for the lighting of 118 miles of roads and streets in the Borough, and that the number of hours during which street lamps have been lighted during the year is 3,866. A substantial part of the Shaw Road lighting scheme has been completed. Rectangular lanterns have been suspended from the tramway pillar arms, with twelve gas burners and a very efficient mirror reflecting system. The installation falls into Class D of the British Engineering Standards Association Specification for Street Lighting, and high uniformity of illumination along the roadway has been obtained. Many other improvements have been made in connexion with both the gas and electric lighting. An experiment has been made with a device for lighting-up the gas street lamps without a continuous lighted by-pass in the lantern. It is reported that a district has been fitted up, and at the moment is functioning very well without any by-pass consumption. The saving of gas by the use of automatic controllers set to extinguish at midnight is put at 21,000,000 cu.ft.

PROGRESS AND DEVELOPMENT OF
The Women's Gas Council

The publication in handy bound form of the Third Annual Report of the Women's Gas Council, with which is included a report of the last General Meeting, the accounts, constitution and rules, list of officers and committee, and particulars of Branches and their executives, provides a very useful book of reference. It is also an index of the progress and development of an organization which is now emerging out of infancy into sturdy youth and doing increasingly valuable work on behalf of the Gas Industry.

We published in the "JOURNAL" last May some excerpts from the Annual Report and referred to the rapid strides which had been made by the W.G.C. since its inception rather more than three years ago. Now that several months have elapsed since we last reported progress and a new "season" lies close ahead, it seems opportune to review in greater detail the activities of the Council and to link up the record of past achievements with present and future plans.

In the first place it is gratifying to learn that the number of Branches is now about forty-five and that the enrolment of the ten-thousandth member is likely to be announced at any moment. And this does not include the affiliated organizations at Bristol and Exeter. We understand that so important a landmark as the passing of the first ten thousand is likely to be made the occasion for some special celebrations in the Branch concerned. In any event, whichever Branch claims the honour of enrolling the ten-thousandth member, it represents a figure on which everyone concerned is deserving of hearty congratulations—for such records are not achieved save by a good deal of hard work and much time given up unselfishly to furthering the aims and objects of the Women's Gas Council as a whole.

Another interesting feature is a move to eliminate the tendency for branches to fall into water-tight compartments and to emphasize the fact that the W.G.C. is a *national*, not a local, organization. In addition, therefore, to coming together only at the Annual General Meetings or the common ground of important exhibitions, Branches are now being encouraged to invite neighbouring Branches to attend their own functions, and several have already done so. This is all to the good, for too parochial an outlook constitutes a psychological, if not an actual, barrier to progress.

Co-Operation with Other Bodies.

The usefulness and scope of the Council's work has been and is being increasingly augmented by working in close conjunction with many national and local women's organizations and other appropriate bodies which are working for the good of the community. Members of the Council executive are closely connected with a large number of outside organizations and officially represent the Council thereon. Miss Willans, for example, represents the Council on the Association of Teachers of Domestic Subjects, on the British Federation of Business and Professional Women and is Chairman of the National Safety-First Association's Home Safety Committee. Miss Halpin is on the Organizing Committee of the Decorative Lighting Section of the Illuminating Engineering Society and a member of the Executive Committee of the Women's Advisory Housing Council, who discuss housing problems with Ministry of Health officials. They were instrumental, for example, in bringing a tenant from Kensal House to give evidence before a recent Government Committee on housing matters. Miss Wilson, the Assistant Secretary of the Council and Editor of their official organ, *Fanfare*, is Hon. Secretary of the National Council of Women Housing Sectional Committee. Co-operation is also extended to a large number of other bodies, including clubs and social and propaganda organizations. There is liaison between the W.G.C. and the Kitchen Planning Centre; lecturers from such bodies as the National Milk Marketing Board and the National Smoke Abatement Society visit Branches, while the B.B.C. give the Council advance information of forthcoming broadcasts of special interest to women.

Reference has already been made in these columns to the part played by the Council at the Domestic Services Exhibition and the Empire Exhibition, and a combined visit of 500 members from all Branches visited Glasgow and saw the fine stand which the Council had there. Further activity in the near future in this connexion includes participation by two separate stands at the forthcoming Women's Fair and Exhibition which opens at Olympia on Nov. 2. At this Exhibition a day will be devoted to W.G.C. meetings in one of the halls when three sessions will be held, including film displays. Stress is also being laid at future public functions on the Gas Industry as a career for women.

The Council is strengthening its work on behalf of the training of demonstrators. The Battersea Polytechnic course in gas cookery demonstrations is now in its second year, and the syllabus includes voice production, practice in demonstrating, and the knowledge and use of gas appliances. The course is open to girls at present studying for a Cookery and Domestic Science Diploma as well as to those already employed in the Gas Industry. It is hoped that the Diploma, which is awarded to holders of the W.G.C. Certificate who have completed a minimum period of two years' practical experience in the Industry, will come to be regarded as of increasing importance in the appointment of personnel for demonstration work. In any case, it gives the holders a status which cannot be ignored and is a parallel with the qualifications demanded of the sales and technical sides of the Industry.

Other activities on the educational side include the Summer School for Demonstrators and the London and Home Counties Demonstrators' Circle, both of which are doing useful work in the direction of increasing the efficiency and experience of gas cookery demonstrators.

Branch Activities.

There is every evidence of the virility of the Branches, and new members are still being enrolled at a very satisfactory rate. The organizing secretaries of the various Branches are members of the staff of the local gas undertakings, and it says much for their ability and enthusiasm that interest in the work of the Council is being maintained and increased. The Headquarters Panel of Lecturers is at the disposal of Branch secretaries, and Branches are asked to make recommendations regarding additions to the Panel whenever they find good speakers available.

Valuable contact is made with local women's guilds and institutes, lectures and film shows being frequently arranged. The strength and the value of the W.G.C. lies in the fact that its membership is not confined to any one class of the community. Any housewife who is a consumer of gas is eligible, and the benefits of membership are open to all. The gas films are available to and are frequently shown by Branches, thus helping to stimulate an increased interest in gas while avoiding blatantly direct publicity. Indeed, this applies to all Branch activities.

Detailed accounts of what the individual Branches are doing are published each quarter in *Fanfare*, and it is apparent from recent announcements that Branches are not only active but very enthusiastic and enterprising, combining regular meetings with excursions and visits to works and other places of interest. Of particular note is a little scheme lately introduced by the Altrincham Branch. If any member attends a meeting without her W.G.C. Badge a small fine of a penny or a halfpenny is imposed, the proceeds of which are used to buy flowers which are sent, together with a letter of good wishes, to any member who is ill.

Special tribute is due to the headquarters' officers and executive. Miss Wolseley-Lewis, Chairman of the Executive Committee, does yeoman service not only in Committee but in many other ways in which her advice and considerable experience are of inestimable benefit to the Council. There is no need to refer here to the energy and ability of Miss Halpin, the Organizing Secretary, and her staff, who have played a prominent part in the initiation of most of the local Branches by attending their inaugural meetings and explaining the aims and objects of the Council—though it should be added that little or no "canvassing" is ever necessary on their part to bring about the successful launching of a local Branch, so great is the enthusiasm which is invariably apparent.

The Council is also fortunate in its President and Vice-Presidents. They are all prominent figures in public life, and special thanks are due to them for their readiness to do all they can to forward the aims and ideals of the Council.

In conclusion we may, perhaps, be permitted to add a word of encouragement to those gas undertakings who for one reason or another have not yet seen their way to sponsoring local Branches. The smaller undertakings may be hesitating on the score of expense, feeling, maybe, that a local Branch would not be worth while, that they have not the personnel or the space available. While the services of a competent demonstrator to act as organizer are essential, there can be few undertakings without the space available either at the showroom or elsewhere for the formation of a small Branch. Even the enrolment of a few score members will amply repay the efforts by inculcating in housewives a feeling that their gas undertaking is not standing still, but is offering something which extends beyond the mere sales of gas and gas appliances—by bringing all consumers together in an effort to increase the service gas can give them. In many small towns the local Branch of the W.G.C. may well be the only organization available as a common meeting-ground for all the women of the District.

There can be no better means of establishing an interested and contented body of consumers than to band them together in an organization which not only keeps them *au fait* with what the Gas Industry is doing for them, but also gives them the opportunity of participating in a national body which is closely concerned with work of benefit to the whole community.

The Education, Training, and Selection of the Technical and Administrative Personnel of the Gas Industry

THE

WILLIAM YOUNG MEMORIAL LECTURE

by

Sir FREDERICK J. WEST,

C.B.E., M.Inst.C.E.

Read before the North British Association of Gas Managers at Largs on Sept. 8.

There are special reasons why I was particularly pleased to be honoured by being asked to deliver the William Young Memorial Lecture. Not only was William Young interested in carbonization in general but he designed a retort on the continuous principle, in collaboration with Sir George Beilby, for the distillation of shale in the first place, which formed the basis of the inventions which were developed into the system of continuous carbonization in vertical retorts associated with the names of Samuel Glover and John West.

The terms of the Trust Deed* under which these lectures are financed are sufficiently wide, I trust, to justify the choice which I have made of a subject upon which to address you, that of the education, training, and selection of the technical and administrative personnel of the Gas Industry. At any rate, I can think of no more important factor in the future development and success of our great Industry. We make no secret of the fact that we aspire to be the universal providers of smokeless fuel and possibly of all fuel for the generation of heat for all domestic and very many industrial purposes, and we shall only realize this aspiration if we have the very best of human material from which to train and select the gas engineers and managers of the future.

The Education Scheme of The Institution of Gas Engineers, to which I shall refer later, came not a moment too soon. The training of the gas engineer requires more careful thought and more serious consideration than ever before in the history of the Industry.

During the last 30 to 40 years—that is, within the active lifetime of the older of those present to-day—the Gas Industry has undergone many changes. To begin with my own personal experience, the art, science, and technique of carbonization has completely changed within that period. Not only has the illuminating standard given way to the calorific standard, but the horizontal retort, which was in full possession of the field 30 years ago, has had to concede a large part of it to the vertical retort in one or other of its forms. But further still than that, carbonization and gas-works practice to-day are carried out with a precision of scientifically controlled operation which is a very great advance on the methods of 30 to 40 years ago, and which calls for a very different type of personnel in the retort house and in the control of the works generally.

And the same kind of development can be seen in every branch of gas manufacture and distribution. All the processes to which gas is subjected for its purification, measurement, storage, and emission to the district are conducted with a greatly increased accuracy and precision and with a greatly increased variety of method.

Distribution, also, involves problems, with which the gas engineer is called upon to deal, in new and ever-increasing variety. Nowadays, undertakings of quite moderate capacity find it necessary to transmit gas over distances which necessitate high-pressure lines with all their attendant plant of compressors of modern design, steel mains, district governors of special design, automatic reliefs, and all the apparatus of high-pressure distribution. While the sales policy, with its multifarious publicity, special tariffs, industrial applications, often entailing intervention in the actual details of the technique of the consumers' processes and requirements, presents the gas engineer with a vastly wider range of problems than that with which his predecessor had to deal.

It may be also said that the ever keener competition of electricity has grown up within the period I have mentioned.

A brief enumeration of the duties which the gas engineer is called upon to perform will be sufficient to indicate the difficulty of the problems involved in his education and training. It is not too much to say that he must be equipped on the technical side with a considerable knowledge of the principles of the three great branches of engineering—civil, mechanical, and electrical—as well as of chemistry.

The cooling of crude gas, the condensing out of the vapours, the washing out of gaseous by-products, and the chemical removal of gaseous impurities involve the construction of apparatus of a highly specialized character, in the design of which chemical, physical, and mechanical considerations must be borne in mind.

The accommodation of this apparatus upon the ground, the construction of heavy foundations for carbonizing plant, of gasholder tanks and other underground work, of railways, retaining walls, and gantries involve problems which are to be classed as civil engineering, while the installation of suitable prime movers and the transmission of power to mechanical handling plant for coal, coke, and other materials involve mechanical and often electrical engineering in many phases. Indeed, the gas engineer is sometimes called upon to devise and install electric generating and distribution apparatus which would do credit to a small electrical undertaking.

On the distribution side the laying of mains through congested urban districts or across open country is often a feat of civil engineering of considerable magnitude; while on the sales side, particularly in the application of gas to industrial purposes, the gas technician must be able at least to appreciate the technique of the processes to which the fuel he has to sell can be advantageously applied.

To return to the works, the behaviour of refractory materials at the high temperatures now customary in the retort house requires an extensive knowledge of physical chemistry in dealing with the problems involved in the design of modern carbonizing plant of whatever type.

The gas engineer must have had personal experience of the use of the scientific instruments in the control of the gas-making processes so that he may be able to appreciate the advantages of new designs and the correct application of calorimeters, of pressure and temperature indicating and recording instruments, including several varieties of pyrometer, and of the analysis of coal, coke, gas, and tar. Without such personal knowledge he will not be able to give due weight to the reports of the technicians he must employ, or be able to comprehend the recommendations they make, in order to arrive at the necessary decisions arising out of them.

If, after the foregoing consideration, further insistence upon the necessity of scientific training for the gas engineer should be necessary, it would at once follow from a mere enumeration of the subjects which have been presented to his judgment by the extremely active and able body of research workers who, during the past few years, have been paving the way for the future development of the technique of gas manufacture and the application of gas to its universal domestic and industrial uses.

Commencing with the organization of research, the first Autumn Session of The Institution of Gas Engineers was held in November, 1929. This was the first meeting of the Insti-

*"Lectures . . . on or connected with the production, application, and distribution of Gas, the *Conduct of Gas Undertakings*, and all matters relating thereto." (Excerpt from the Trust Deed of the William Young Lectureship Fund, Nov. 24, 1910.)

tution devoted entirely to research. If we go back to that date we find that the Joint Research Committee of the Institution and Leeds University and the Refractory Materials Joint Committee submitted reports, while the recovery of ammonia and the disposal of liquor effluents from the works were dealt with by two Committees who presented four reports.

In 1931 we began to feel the influence of Watson House, the magnificent research institution set up by the Gas Light and Coke Company in London, members of whose staff submitted a communication on Combustion Standards of Gas Appliances. In this year the Committees dealing with ammonia and with gas-works effluents were combined and submitted their first report as the Liquor Effluents and Ammonia Committee, while the Joint Lighting Committee submitted its first report on Street Lighting.

In 1932 two new Sub-Committees were appointed, one to deal with Gas Appliances and the other with Industrial Gas, and the Gasholder Committee to deal with questions arising out of the need for the proper inspection of gasholders presented its first report, while the Calorimeters Sub-Committee was set up.

In 1934 the announcement was made of the Duckham Research Award under which a sum of £350 per annum was made available to finance investigations by chosen workers into activities at home or abroad which might be of interest to the Gas Industry.

In that year the Institution decided that research must be put on a more comprehensive footing. The new scheme of research and technical organization came into being in 1935. It provided for (*a*) a large Advisory Committee composed of representatives of the Institution, the National Gas Council, the B.C.G.A., the Fuel Research Board and other Government bodies interested in Fuel Research, the Livesey Professor, the members of the Research Executive Committee and the Chairman of the various Committees and Sub-Committees, (*b*) a Research Executive Committee of the Institution, and (*c*) a Technical Assistant Secretary.

Committees were then dealing with research investigations covering a wide range of subjects. The Joint Research Committee of the Institution and the University of Leeds (Fuel Department) continued its work, while special Committees were dealing with Gas Appliances, Gasholders, Lighting, Effluents and Ammonia, Meters, Pipes, Purifiers, Refractory Materials, &c. Allied with them were the Institution's Gas Research Fellow and the Livesey Professor. And last November a Committee was appointed to enquire into Gas-Works Safety Rules.

The subjects dealt with by these Committees and organizations cover an immense field. The products of combustion of town gas in typical gas appliances; the corrosion of the various metals used, or proposed to be used, in their construction; studies in carbonization branching out into considerations of the problems involved in carburetted water gas production, and the adumbration of entirely new methods in the gasification of coal, such as the use of oxygen and high pressures; the removal of sulphur from town gas; the gum problem; many problems arising out of the utilization of gas, such as the study of radiant energy and its measurement; the ignition of gas by catalysts and the evolution of combustion standards; gasholders, their inspection and the methods of keeping these important structures in a condition of safety and efficiency; lighting; calorimeters; ammonia and the effluent question; the properties and use of coke; industrial furnaces and the influence of furnace atmosphere on scaling —this is a selection of the lines upon which research has been conducted during the last nine years which I have surveyed. The intelligent perusal of the reports on the work which has been done requires an extensive knowledge of chemistry and physics, and it is clear that a sound education in the fundamentals of these sciences is absolutely essential to the gas engineer to enable him to understand and appreciate the work of the research specialists, and to enable him to apply the results of their work in practice.

The Education Scheme of the Institution is designed to ensure that, in future, every young engineer seeking membership shall be equipped with this necessary knowledge. From the date of its introduction in 1923 the Education Scheme of the Institution has been developed into a system which is admitted on all sides to have thoroughly justified its existence. As it stands to-day it may fairly claim to have completely regularized the admission of young men to the Industry, to have provided a test of education and ability which should reject no worthy candidate and admit no unsuitable person, and to have provided facilities for practically every young man, whether living in a large town and whether associated with a large undertaking or not, to qualify himself to pass the necessary examinations.

Here I think we should acknowledge the excellent account of Technical Education in the Gas Industry by Mr. C. H. Creasey, formerly one of His Majesty's Inspectors, who represented the Board of Education on the Education Committee and latterly sat on the Committee as a representative of the Institution, in the Paper which he presented to the Chemical Engineering Congress in London in 1936.

It may be said that to-day entrance to The Institution of Gas Engineers is largely restricted to men who have availed themselves of this admirable scheme. The Higher Grade Certificate in Gas Engineering (Manufacture or Supply) is a qualification for Corporate Membership of the Institution.

It was no small problem to devise a system which should give equal opportunity to students associated with the great gas undertakings and living within easy reach of the great technical colleges, to students associated with the smaller undertakings, in many cases situated many miles from any such educational institutions, and to students whose facilities for self and assisted education ranged over every degree between these two extremes.

The problem was solved by arranging, in the first place, for courses to be given in gas engineering and/or gas supply at as many Approved Centres as possible. About 45 of these Approved Centres, necessarily situated in the cities and larger towns, provide major courses in Gas Engineering (Manufacture and Supply), while many others provide minor courses. "Students who are unable, by reason of their place of residence, the nature of their employment, or any other reasonable cause, to attend a Course" are permitted to prepare, as best they can, by individual reading or by correspondence tuition, for examinations which are held at a number of convenient centres for them. Very often such students are able to avail themselves, to a limited extent, of technical education in the Ancillary Subjects, but "while external students are strongly advised in their own interests to attend classes at colleges, there are no restrictions as to where or how instruction is obtained, nor is there any restriction as to the period during which the examinations must be passed."

The Education Scheme is administered by the Gas Education Committee of The Institution of Gas Engineers which acts in co-operation with the Board of Education of England and Wales and similar bodies in the other constituent countries of the United Kingdom. While 14 out of its 32 members are appointed by the Council of the Institution, five are appointed by the Board of Education of England and Wales, one by each of the other three similar authorities in Scotland and Ireland, and one by each of the ten District Gas Education Committees. The actual examinations are conducted by a Board of Examiners appointed by the Council of the Institution with one or more Assessors also appointed by the Council. The District Gas Education Committees serve to keep touch with local conditions and to ensure that every student is able to obtain advice from a body of men who are conversant with the conditions under which he works, and by their representatives on the Central Committee to keep that body informed of the conditions prevailing in every part of the country.

The Courses of Instruction upon which the examinations in Gas Engineering (Manufacture) are based cover Mathematics, Chemistry, Physics, Engineering Science, Machine Drawing, and elementary Gas Engineering in the Ordinary Grade, extending to Heat Engines, Higher Mathematics, and specialized instruction in the higher branches of Gas Engineering for the Higher Grade examination. The Courses in Gas Engineering (Supply) are similar, with the exception that some instruction is given in electrical engineering, and the specialized instruction is concerned with Gas Supply. The Diploma is awarded on the results of an original thesis upon a subject approved by the examiners, a written examination, and an oral examination.

The reports of the examiners to the Gas Education Committee of The Institution of Gas Engineers frequently call attention to the "necessity for a good general education to

produce a trained mind . . . upon which to build knowledge of engineering and chemical subjects."

The examiners point out that "students are strong on either the engineering or the chemical side to the relative exclusion of the other." They call for instruction in sketching and drawing, particularly for those students who have not had the advantage of drawing office experience. They remark that "candidates show a lack of knowledge of first principles." But there is nothing upon which they lay more emphasis than "the advantage which a sound general education gives to those who desire to specialize in technical subjects."

Here are some more of their remarks on this and allied aspects of the same subject:

> "There was evidence . . . that a lack of chemistry and physics limits a candidate's ability to deal with modern problems of gas distribution and utilization."
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> "The underlying principles were only very vaguely appreciated."
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> "Candidates in all grades experienced difficulty in communicating their knowledge."
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> "Answers were spoiled by being badly written and untidy."
>
> "The general knowledge displayed . . . was weak."

All these reports contain statements which emphasize the view that the young men from whom the technical personnel of the Gas Industry are to be recruited must begin with a good general education, particularly in English, and with a sound knowledge of, at any rate, the elements of chemistry and physics, the two sciences upon which the superstructure of the technique of the Gas Industry is built.

From time to time amendments have been made in the scheme and it has already reached a high state of perfection. Future developments would seem possible in at least two directions.

For internal students there is need for Day Courses in the larger Technical Colleges, so that students working and employed in the gas-works, and who sometimes have to travel considerable distances to the colleges, may be able to attend classes on one day in the week instead of having to travel three times per week for evening classes, as is very generally necessary to-day. And for external students it would seem possible to develop still further tuition by correspondence.

It is impossible to withhold an expression of the deep indebtedness of the Industry to the unselfish, untiring, and very successful work which is put into the organization and administration of the Education Scheme by many members of the Institution, whether as examiners or as members of the central committee, particularly those working, in the first place, in the District Education Committees in touch with the actual raw material from which the recruits are drawn.

Comparative statistics appear to show that the number of examinations held each year is stabilized at something between 400 and 450, at any rate, during the last six years. The average number of Diplomas in Gas Engineering (Manufacture) obtained each year over the last 10 years was about 8, but 16 have been awarded this year. As yet very few Diplomas are granted in Gas Engineering (Supply). The average number of successes in the Higher Grade examination in Gas Engineering (Manufacture) over the same period was about 60, while the corresponding figure in Gas Engineering (Supply) was about 40. These, particularly the latter, are definitely tending to increase.

In quite a different category we have the Department of Coal Gas and Fuel Industries in the University of Leeds, under the direction of the Livesey Professor. It is not an integral part of the Institution's Education Scheme, but it is a very valuable part of the educational facilities available to gas engineers. It deals almost exclusively with the manufacturing side, but suggestions are already being made that it should be considered by the University whether the courses could not be extended to other sections of the Industry. The University of Sheffield and the Imperial College of Technology have well-equipped and well-staffed departments for the study of Fuels, the University of Manchester includes on the staff of the Municipal College of Technology a Lecturer in Fuels, and there are other technical colleges, the Wigan and District Mining and Technical College and the Treforest School of Mines, in which full-time courses in Fuels are provided.

Here I may be permitted to digress to make a brief comparison between our own Education Scheme and that of some of the great Continental Countries. I am indebted to a recently published book by Mr. Swierczewski, formerly Director of the Warsaw Gas Undertaking, Poland, for much of my information on this subject, and also to M. Henri Cassan, Chief Engineer to the Compagnie Générale de Construction de Fours, Paris, for details of the French system.

The higher education of gas engineers in Germany is dominated by the famous Technical High School at Karlsruhe, opened in 1907 under the leadership of the late Professor John Bunte and now carried on under that of Dr. Karl Bunte. This establishment might be said to correspond to the Gas Engineering Department at Leeds University, in that it combines investigation and research with education and training. Several of the other technical high schools in Germany, notably those at Berlin, Breslau, Darmstadt, and Munich, include courses of lectures in gas engineering in their curricula, but there would not appear to be anything in Germany corresponding exactly to the Education Scheme of the Institution in this country by which the whole system of education is co-ordinated.

In France, higher specialist education is provided for by three courses of lectures per annum held in Paris, each covering a period of two weeks. These are supplemented by other schemes for the education of the lower ranks of the profession. Other Continental countries present examples of special courses of lectures and varying degrees of co-ordination and collaboration between the educational institutions, the gas undertakings, and the professional associations of gas engineers.

One might summarize this survey by saying that a study of the facilities for education on the Continent leads one to the reflection that our own system is commensurate with the important position which Great Britain holds in the Gas Industry of the world.

During the period covered by the Education Scheme, the efforts of the young engineer have been concentrated upon the acquisition of the necessary technical and practical knowledge for qualification for a managerial or administrative position in the Gas Industry. The presentation of these qualifications to secure a suitable opening or advancement in the profession certainly requires some consideration. The compilation of an application, the presentation, concisely and convincingly, of the necessary qualifications for a vacancy when interviewed, present difficulties which must not be underrated. Assuming that an interview with an individual, Committee, or Board, is the position which most candidates are confronted with, to qualify for and secure such an interview necessitates a written application, the essential function of which is to establish clearly and concisely the possession of the necessary qualifications and experience for the position. It must not be too verbose and it must present to the reader clearly and quickly a sufficiently convincing prima facie case for the suitability of the candidate. The next step is, perhaps, the most difficult, and many candidates fail, and some hopelessly, because sufficient thought and consideration has not been given beforehand to the presentation of one's case at an interview. How frequently one hears of the man who has been on many short lists and fails to secure advancement, not because he does not possess the necessary qualifications, but because he lacks the capacity to present his own case clearly and convincingly.

We have, in connexion with the Manchester University, an Appointments Board for assisting students to secure suitable positions; and one of the Committees of this Board grants interviews to students with a view to advising them on their future careers, but particularly to give them experience in presenting their case before a Committee or Board. It is an exceedingly interesting experience to observe how those interviewed attempt to develop their case. Some make a very favourable impression, some fail deplorably. My 29 years' experience in Municipal Government and the interviewing, during this period, of many candidates for varying positions, suggests a few leading points to be observed. I would say to the candidate: "Look your interviewers in the face boldly; if you are sitting in a chair, don't loll about, and whether sitting or standing, don't put your hands in your pockets; speak up so that everyone present can hear; don't talk yourself out of the job by overstating your case or weary your audience with long statements. Don't hesitate in your reply

to any questions, and, if you cannot reply satisfactorily, do not hesitate to admit lack of knowledge of that particular subject."

But there is one important qualification for success as a gas engineer which must never be overlooked and which deserves far greater consideration than it generally receives. It is the capacity to control and lead others. There are few instances where engineers operate in what might be termed a single-handed way. They are probably more dependent than any other profession on the help and co-operation of others to bring their plans to a successful conclusion.

A close study and experience of industrial problems, the occupancy of the Presidential Chair of the Manchester Engineering Employers' Association during the years 1916-17, and membership of the Industrial Arbitration Court for two years, have all brought to my observation and compelled me to give close study to a wide range of industrial problems, and have left the outstanding impression that a very considerable portion of industrial unrest, petty disputes, the absence of good team work, is the outcome of some weakness and inability on the part of those in managerial and supervisory positions to handle the personalities under their control. The success of any concern, no matter how large or well organized, depends very materially upon those in authority exercizing tact and diplomacy with a careful and sympathetic consideration of human nature. From time to time one comes into contact with men who appear to possess the highest technical and practical qualifications, but fail lamentably in positions of responsibility owing to their failure successfully to control and direct others. On the other hand, one is frequently confronted with the case of the man with moderate technical and practical training, who is a brilliant success in a position of responsibility, mainly because of his competence in dealing with the human element.

One cannot lay down any golden rule or prescribe a particular course of study to acquire this capacity for leadership and successful control of others. One often hears the statement that a certain person is a "born leader," but while there may be some truth in the idea, and while some persons appear by intuition to possess more of this capacity for leadership than others, it is within the reach of all to cultivate such capacity as they have. Summarized briefly, leadership requires tact, diplomacy, kindly consideration for the difficulties and weaknesses of others, patience, and unselfishness. It would be quite safe to say that in most appointments to-day, Committees and Boards do not confine their consideration only to the technical and practical experience of candidates. Definite evidence is sought for as to the capacity of a candidate to control staff and workpeople, and such capacity is often a determining point in an appointment, and very rightly so, too.

Under an almost similar category, and by the possession of similar qualities, the success of the gas engineer in his relationships with his Committee or Board may be ranged. Mutual confidence is an essential, but again it is quite safe to say that tact, diplomacy, consideration, and patience are just as essential in securing the confidence and appreciation of one's controllers as the possession and exhibition of the necessary technical knowledge and practical experience. One frequently hears of difficulties and friction between engineers and managers and their Committees or Boards, but the fault does not always lie with the latter. A well-known gas engineer once made the remark, "I can manage my gas-works before breakfast, but it takes me the rest of the day to manage my Committee." This was not by any means so facetious as it sounds; he really meant that in guiding and advising his Committee he had a very important duty to perform and one which required his constant and close attention. Again one cannot prescribe a "golden rule" to ensure success in this particular duty. But once more consideration of the human element is essential because Committees are composed of individuals with widely varying views and differing outlooks. Patience and toleration for the views of others are essential, and a willingness to explain simple, and what sometimes appear comparatively unimportant, points. I remember a new member of a Committee on which I served asking the technical adviser a very simple question which betrayed an almost appalling ignorance of the subject under discussion. The technical adviser treated the question as if it had been one of the greatest importance. He gained the confidence and loyal support of the questioner for many years ahead. To-day this technical adviser occupies one of the highest positions in the country. He possessed very high technical qualifications, but, at the same time, the patience "to suffer fools gladly."

There are many features in present-day gas-works administration which are not covered in courses of technical instruction, and can only be learnt by actual experience. These cover a wide range, but just a few are Factory Law and Government enactments, purchasing and stock control, costing, and management generally. It has been said that management is an art and does not lend itself to being taught. There is some truth in this, but it must also be recognized that management has nowadays acquired many of the characteristics of a science as well. While the art may be inherent in the individual, the science calls for training and application of a kind for which specific consideration and thought are necessary.

Recognizing the intricacies and problems of present-day works management, the Manchester engineering employers, in conjunction with the Manchester College of Technology, have founded a Department of Industrial Administration which has for its object the development of suitable courses of study for those who are being trained for managerial positions. Is it outside the limits of possibility that such a course of study might be made available to those training for administrative posts in the Gas Industry? It is, at any rate, important that these subjects should not be overlooked or regarded as merely routine work which may be left entirely to be acquired by experience.

We shall all be in complete agreement that the Gas Industry offers great opportunities for initiative and ability. We shall, further, all be in complete agreement as to the desirability of attracting to our Industry young men of the highest character and intellectual capacity. But initiative, ability, and intellectual capacity can only be secured if the monetary reward is sufficient, and compares favourably with that in other walks of life. It is certain that the Gas Industry will fail to attract the right type of man if the remuneration offered is so meagre (as it is in too many cases) as to be almost an insult to his intelligence and self-respect. This is not the time or place to set up a scale of salaries to fit junior and senior positions in the Gas Industry, but it is opportune to comment pointedly upon salaries offered, frequently by advertisements in the Technical Press, which suggest a totally mistaken outlook as to the proper value and suitable remuneration for a technically trained man.

During the last few years there have been several examples of salaries offered by advertisement which exhibit, to say the least, a dangerous ignorance of the value of the services of adequately trained technical men. The equivalent of four to six pounds a week for positions requiring engineering and managerial experience with laboratory and drawing office training, except for very junior positions, is totally inadequate to attract or retain the right type of man for our Industry, and yet advertisements are published from time to time which offer remuneration as low as this.

In many Works leading hands and foremen are paid equal and higher salaries, and a continuance of a policy of cutting or reducing salaries in the Gas Industry can only lead to a decline in the quality of its technical personnel. The subject of salaries for technical and managerial positions in any industry from the point of view of fixing adequate or standard remuneration is a difficult one, but it is surely not outside the scope or authority of some representative body of the Gas Industry to raise an emphatic protest when attempts are made, as they have been and will be, if no notice is taken, to lower the status and value of those responsible for the successful operation of gas undertakings.

Gas Engineering as a career should be made more attractive, and those responsible for the managerial functions in gas undertakings, as well as Gas Committees and Boards of Directors, should see to it that openings are made which provide a proper "pupilage" with suitable remuneration to secure a constant supply of well-trained men for the higher positions. The day of the premium pupil is past. Most engineering firms have abandoned this method of providing suitable recruits, and have established various methods for training well educated young men from the Secondary or Public Schools or Universities, by which they are equipped for taking their part in technical, supervisory, or managerial

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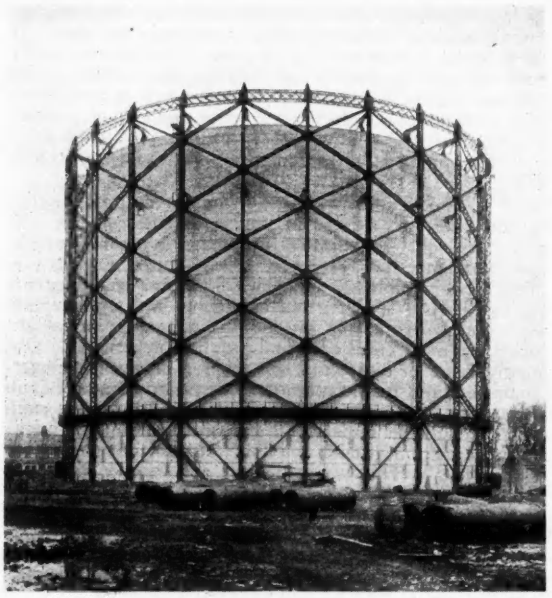

GASWORKS PLANT AND STRUCTURAL STEELWORK

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Telephone: ABBEY 3121 Telegrams: RETORTUS, SOWEST, LONDON

Telephone: EAST 5231 **Providence Iron Works, Millwall, London, E.14.** Telegrams: CUTLER, MILLWALL, LONDON

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positions by special courses of training and education quite distinct and separate from that of the ordinary trade apprentice. And during this period their remuneration is sufficient, at any rate, to make a reasonable contribution to their livelihood.

There is room for improvement in the status of Gas Engineering from the point of view of the outlook of the young men of to-day seeking a career. Electrical Engineering has proved an attractive profession, and no difficulty has been experienced in securing young men with exceptional ability to train for the technical and managerial positions.

The Gas Industry has for too long been looked upon as decadent and unattractive by young men seeking a career. I remember, some few years ago, interviewing a young Cambridge graduate who was going abroad to take up a position with a Gas Undertaking. I commenced by saying to him, "I suppose that when your particular chums at Cambridge heard that you were entering the Gas Industry, your standing, which previously had been fairly high with them, sunk to 'zero.'" He replied, "You are quite correct." I am afraid we are ourselves to blame to a considerable extent for this unenviable position. We have not been sufficiently emphatic in encouraging and demanding a greater appreciation of our Industry. But the past 10-15 years have, to some extent, successfully combated this low estimation of the importance of the Gas Industry and its valuable contribution to Industry and domestic life. We cannot too frequently remind the "man in the street" that an Industry which has 11½ million customers, employs 120,000 men, has 220 millions sterling invested in it, converts annually 18 million tons of coal into gas, coke, and by-products which are used in a tremendous range of industrial processes, is an important public utility service which can, and does, provide many opportunities for men possessed of brains and ambition.

Before I bring this study to a close I must mention another means of acquiring knowledge and experience quite apart from the technical training of the college or school and the practical training of the Works. The Gas Industry is well provided with Technical Associations which are all organizations for "pooling" knowledge and experience. The Institution of Gas Engineers, with a membership of 1,666, is a progressive and modern organization. The Senior and Junior District Associations provide excellent opportunities for the dissemination of technical and practical knowledge of every phase of gas-works practice and gas supply. They provide those useful opportunities of personal contact and heart-to-heart talks which are so valuable in extending first-hand knowledge of theory and practice. For this reason it is essential that Committees and Boards controlling gas undertakings should encourage and offer every facility to their technical officials to participate in the organized meetings and visits of interest which these organizations offer. One deplores the argument that is, one hopes, only occasionally raised, that meetings and visits waste much time, are "joy rides," that the Papers submitted can be read in the Technical Press, that the expense in travelling is not justified, &c., &c. I have heard these arguments advanced on several occasions during my Municipal experience, but I have always contested them and urged a broader outlook as the only wise policy.

The advancement of the Industry depends materially upon the activities of our technical organizations, as, apart altogether from the opportunity they provide for the training of men to express their own thoughts and experience in writing, in speech, and in open debate, they also provide scope for organizing ability and experience arising from Committee work and the filling of official positions. A young man who has served his term as President of his Junior Association has had an experience in controlling meetings and debates which must be invaluable in his later career.

Drawing this Address to a conclusion, I am quite conscious of its incompleteness and its inadequate survey of the whole question of education and training. I have purposely refrained from advancing any suggestion as to what particular preliminary education is essential in those from whom we recruit our Industry. Whether our recruits should come from the University, Technical College, Public School, or Secondary or Elementary School, is not the point at issue. There is room and scope in the Industry for entrants from all these sources, providing it is recognized by those who seek leading technical and managerial positions that a high degree of technical knowledge, as well as practical training, is an absolute essential.

Finally, in view of the fact that the Gas Industry is a public utility service supplying a fundamental necessity of the commercial, industrial, and domestic life of the nation, we must see that it attracts the right type of personnel, and we must ensure that that personnel is adequately educated and trained to carry out the multifarious duties involved in so important a service. We must insist that nothing but the very best will suffice to fill the positions which we occupy to-day, recognizing that the education and training which we received, good as it may have been in its day, will not meet the demands of to-day or to-morrow. If this Lecture does nothing more than focus your attention on the scope and the extent and the quality of the education and training which are necessary for the gas engineers who are to carry on where we leave off, then I shall be amply repaid for the effort I have made to present to you the factors which I sincerely believe govern the most important problem which confronts our Industry to-day.

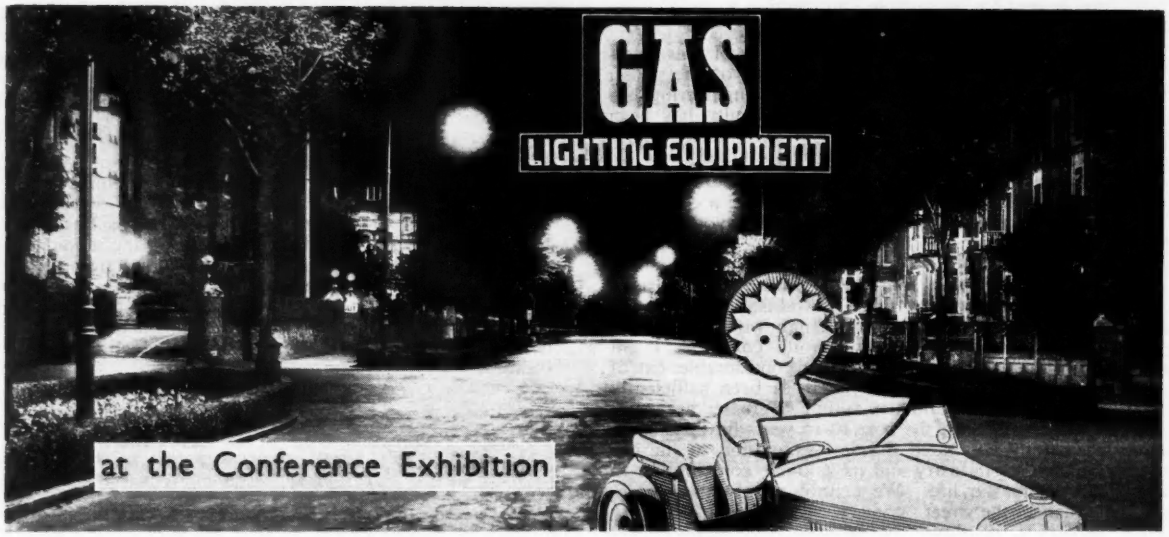
Vote of Thanks.

Mr. J. W. McLusky (Glasgow) said that in Sir Frederick's lecture they had made a dignified and distinguished addition to what was already a formidable list of William Young lectures. They were very proud of their lecturers and very careful in their choice. Sir Frederick belonged to a family of gas engineers who had a national reputation for ability and integrity. He came to a Scottish Gas Conference as a very old friend who over a long period of years had been familiar with their problems and most helpful with reliable advice. It followed therefore that the particular subject which he had chosen for his lecture would be handled in a masterly style. They welcomed this lecture as an official statement of national gas policy in so far as the preparation of youth to take subsequent control was concerned, coming as it did from one of the leaders in their Industry. The advice given by Sir Frederick to the juniors was sagacious and timely. In his long experience of affairs, commercial, practical, and technical, he had seen an army of youngsters become responsible executives. Who, then, was better able to indicate the ways and means to be adopted by the youth with ambition? But the lecturer had not forgotten that the official in charge was not beyond receiving advice and there were also valuable hints for those who assembled in committee and board rooms. Sir Frederick could rest assured that his lecture would be carefully read and pondered over by a very wide circle, both young and old. It was a study which would amply repay them. He had pleasure in moving that their best thanks and appreciation be expressed to Sir Frederick West for his very able lecture.

Mr. J. Dickson (Kirkintilloch), supporting the vote of thanks, said he could heartily endorse all that Mr. McLusky had said. They were deeply indebted to Sir Frederick. The name of West was honoured in the Gas Industry and Sir Frederick had added lustre to it.

Mr. R. Robertson (President of The Institution of Gas Engineers) said Sir Frederick had shown how the Industry must prepare itself for its high calling. The selection of personnel was as important as the selection of raw material. Nobody was better able to deal with this aspect of the subject than Sir Frederick. He was a large employer of labour, called on to deal with questions of employment. He had a wide experience of public affairs and had travelled extensively, using his facility for observing and recording his impressions. The matter of education was one which the Institution had greatly at heart and Sir Frederick had given a good idea of the kind of work which had been attempted. It was no easy matter to lay down a common standard for such a varied class of entrants to an Industry in which so many different duties had to be performed. For this reason it had been necessary from time to time to amend the regulations. Sir Frederick had named many qualifications demanded by the Industry. The gas engineer had to be a chemist, a psychologist, and many other things as well. For these qualifications he had a salary barely adequate for a workers' foreman. They were indebted to Sir Frederick for calling attention to this matter. It was to be hoped that his words would reach the ears of the chairmen of gas undertakings so that the things mentioned might be remedied. Adequate salaries should be paid and the best men attracted. He had suggested certain additions to the curriculum. They had to admit that the official schemes of the Institution did not provide for administration training. Some knowledge of the principles of business management should be obtained by would-be leaders in the profession. The Gas Industry was facing a new situation to which it must re-orientate itself. Its job was to prepare for the future.

THE ASSOCIATION OF PUBLIC LIGHTING ENGINEERS



On this and the following page we review some of the interesting displays by manufacturers of gas lighting fittings and accessories in the exhibition which was organized in connexion with the Conference of the Association of Public Lighting Engineers at Bournemouth last week.

The old-established firm of **W. Parkinson & Co.**—with more than 120 years' service to the Gas Industry—were showing a range of their gas street lighting equipment which has been proved in use by lighting engineers in all parts of the country.

Their "Maxill" type "G" is an efficient and adaptable unit, square in section and of pleasing design in keeping with modern trends. Each preheater is provided with separate supply pipe with gas and air adjustments ensuring adequate aeration and high efficiency. Twin reflectors of faceted anodized aluminium give very high reflectivity and the greatest possible distribution, the patented reflectors being adjustable in all directions with provision for correct distribution of light on acute road bends. The whole of the interior of the lamp is removable as one unit *in situ* for easy maintenance.

Two "Maxill" 12-light standard type lamps were exhibited, including one for reducing the number of effective mantles at any time. This unit is ideal for competitive schemes, being highly efficient, of sound construction, and low priced. Fitted with two 56-facet paraboloid metal adjustable reflectors, the unit gives an even distribution, while the case is of modern design, square in plan and tapered from the waist downwards. The gas and air regulator is housed in the body of the lamp and free from the contamination of the primary air by products of combustion. Special ventilation and weatherproofness are other features of this lamp, which is available in sizes from 6 to 12 mantles.

The firm's "Maxilla" lamps, also shown, are designed to meet the requirements of Group "B" installations, and are available up to 6 mantles and in various types. Parkinson were also showing two examples of their "Warwick" square lantern fitted with the well-known combination of "Morlite" and curved top adjustable stainless steel reflectors and with faceted mirror glass reflectors. All the exhibits on this stand were fitted with controllers and igniters supplied by the Gas Meter Company and the Horstmann Gear Company.

The **Horstmann Gear Company, Ltd.,** had a comprehensive display of Newbridge automatic control and ignition devices, including a type of clock controller and "Comet" for practically every type of gas lamp. For suspension lamps already fitted with controllers an independently mounted "Comet" can be applied.

The success of "Comet" ignition and its efficiency is evidenced by the fact that during the past eighteen months over fifty thousand public lamps have been fitted with them. This form of ignition for gas lamps has several advantages over the system of kindling burners by means of a constantly burning by-pass. First, manifest economy in gas consumption is achieved, which may be devoted to the employment of larger burners giving a greater luminous output. Secondly, "Comet" ignition is more reliable than by-pass ignition, especially in stormy weather. Thirdly, as a result of the reliability of "Comets," public lighting maintenance costs are considerably reduced.

Newbridge controllers and "Comets" were shown applied to many types of street lamps under actual working conditions.

Some interesting experiments are in hand by this Company in connexion with air raid devices for public lamps, particulars of which were available on the stand.

The Newbridge Solar Compensating Dial is an interesting new development by the Horstmann Gear Company, Ltd., designed to cover the daily variation in the times of sunset and sunrise, with its consequent effect upon lighting and extinguishing times. The irregularities in the solar curve, which become more pronounced the further one travels from the Equator, are fully and correctly compensated by means of the dial, thus ensuring the maximum degree of accuracy in the lighting and extinguishing times for the area concerned. The dial, which can be fitted to a wide range of controllers, is also capable of adjustment to provide for variation in longitude. Dials to follow practically any desired lighting and extinguishing schedules may be provided to special order. Once the dial has been set it will continue automatically to reproduce the correct lighting and extinguishing schedule.

A representative display of various types of lighting equipment by this Company was exhibited by **Holophane, Ltd.** One of the most interesting exhibits was a special A.R.P. fitting, for use in industrial yards and open spaces. The unit has a cut-off reflector with a special glass filter and an attachable reflector shield to prevent light distribution above the horizontal. An interesting display of components and sectionalized units of the Holophane street lighting glassware were staged. Holophane gas refractors were also shown by various gas street lighting manufacturers in their different types of lanterns. Holophane lumeters and auto-photometers were another special feature on this stand.

Several new additions to the range of Guardian Angel illuminated guard posts were exhibited by **Gowshall, Ltd.,** most of the posts being finished in fired vitreous enamel. A new type of glazed illuminated post was shown for the first time, the design having been influenced by the report of the M.o.T. Departmental Committee on Street Lighting. A selection of floodlit signs was also exhibited, illumination being provided by "Mandalite" single and double fittings.

The exhibits on the stand of **Keith Blackman, Ltd.,** included "Magnalux" 1 and 3 light low-pressure gas lamps, together with an underground control cock for high-pressure lamps, and temporary connexion equipment, with cock for service pipe for the maintenance of the lamp at ground level.

Examples were shown of a type of lamp embodying a principle which makes it possible to provide with low-pressure gas a lighting unit approaching in power the results obtained with high-pressure gas and of an efficiency considerably higher than that obtained by the usual low-pressure gas lamp. The firm's "Nominal Suspension Lamp," for use on high-pressure gas, is complete with automatic lighter for distance lighting, and has a chromium-plated

copper casing and dome, black enamel cowl and reflector, and forms a handsome unit. There were also demonstration sets of Keith Blackman standard pattern raising and lowering gear with self-sustaining winch and wire rope, and a similar set using non-corrosive metal tape instead of wire rope. The latter type of winch has many advantages over the rope type. The "Staybrite" tape is immune from corrosion and therefore does not deteriorate or require maintenance. It obviates twisting, while a device prevents the coiling of the tape on the drum in the wrong direction.

The exhibit of **C. H. Kempton & Co., Ltd.,** comprised samples of the Company's latest low-pressure gas lamps for the illumination of roads to the requirements specified in the M.o.T. Final Report on Street Lighting, 1937. Their "Starlyte" lamps are samples of a new range of fittings, having better distribution characteristics than the earlier models. In response to demand three and four way reflecting elements are being designed and will shortly be available.

A new development by Kempton is their "Triumph" low-pressure lamp with 10 or 12 No. 2 mantles. This is an efficient unit having a useful flux distribution, whose maximum beams can be focused to meet the individual requirements of spacing, road surface characteristics, &c., including adjustable mirror-glass reflectors to prevent the more distant lamps causing dazzle to an approaching driver.

The stand of **Walter Slingsby & Co., Ltd.,** was chiefly devoted to the "Wask" patent "Up and Down" lamp suspenders for raising and lowering overhead street lamps with the supply connected to the lamps at all times during the full process of raising and lowering. Two one-third scale working models on typical columns were fitted with small lamps (one arranged for gas lighting and the other for electric), so that the simple and definite action of the hook, and the advantages of the swivel joints and tubes, could be demonstrated and thoroughly inspected. Both gears were connected to their respective supplies in order to show how the lamps may be lowered without being extinguished, which is a great advantage for testing and adjusting the lamps, while the absence of gas valves or electric contacts, which are often a source of trouble, could be readily seen.

The "Wask" gear can be fitted to lamps at any height or overhang, and is of great assistance in carrying out the final recommendations of the Ministry of Transport in mounting lamps 25 ft. high, due to its big saving in maintenance cost and the safety afforded both to the attendant and the road users when the lamp is down on the kerb out of the traffic stream.

A number of examples of high efficiency lighting units for both Group "A" and Group "B" roads were exhibited on the stand of **William Sugg & Co., Ltd.**

The output of the 12-light "B/2" "London" lamp has been increased by a new burner design, which also gives an exact air adjustment and the optimum gas-air mixture for gases of different composition. The mirror-glass reflector system is designed to give excellent visibility and to reduce glare to the minimum. The use of shaped glass reflectors gives a very high degree of light control without undue absorption. The "Folkestone" lamp, which was exhibited in embryo form last year, was shown in its perfected form. This unit is of the "cut-off" type, and installations are characterized by an entire absence of glare and excellent visibility. The larger sizes of "Rochester" lamp are also suitable for Group "A" lighting, and a typical unit was shown.

An example of "Three-way" "8000" lamp, for Group "B" lighting at junctions, showed the compact and efficient design of this lamp, the dimensions of which have been kept to the practical minimum to that a simple, but effective, mirror-glass reflector system can be used and cost is low. The patent "Sugg-Horstmann" series "Comet" system of distant control was demonstrated in action.

Another item of interest was a system of light control for refuge lamps. The gas supply is controlled by the daylight illumination, and the method does not involve the use of any high tension or high capacity batteries. A 3-volt dry battery is all that is required, which will last about eight months. Suitable designs of refuge indicating lamps were also shown. A safety "cut-off" valve, to prevent the escape of gas in the event of an illuminated guard post being knocked down, was demonstrated. This valve provides a great safety factor as guard posts are frequently destroyed and the ignition of escaping gas may cause considerable damage.

An interesting display of the well-known "Gunfire" products was made by the **British, Foreign, and Colonial Automatic Light Controlling Company, Ltd.** In the Gas Section a comprehensive range of Gas Controllers was displayed, including models available for all types of lanterns, for street lighting, floodlighting, central heating boilers, &c., including 15, 21, or 40 day gradual and quick action types, and among the latter type a new model of especially compact design. A removable plug for easy greasing without dismantling the unit was another feature.

A very comprehensive range of controllers was staged on the stand of the **Gas Meter Company, Ltd.,** covering the requirements not only for street lighting but also showroom lighting, both exterior and interior. The firm especially featured a new type of metal case fixing for universal purposes, which, by slight adjustment, may be used for ascending or descending lamps. Other special controllers can be arranged for cluster lighting and for showroom purposes operating on selected days of the week only. In addition, the exhibits on this stand included an emergency control for street lighting of special interest to A.R.P. officials.

A representative display of "Avil" equipment for public lighting by gas, supported by a readiness to give welcome and assistance in lighting problems, was found at the stand of **Foster & Pullen, Ltd.**

The "Alpha" lamp for Group "A" roads was shown in conjunction with the new "Beta" lamp for Group "B" roads, two lamps of special interest. The former, available for six, eight, ten, or twelve mantles, was shown in the twelve-light size with constant pressure governor and Newbridge controller incorporating "Comet" ignition. This lamp is the "Avil" contribution to uniform street illumination, having a twelve-light alignment burner needing only one by-pass and equipped with mirror glass reflectors; the mantles are accessible without removal of any internal parts, and the lamp, of rectangular construction, gives a solid rectangle of light without glare.

The "Beta" lamp, of new design, is for use in Group "B" roads, being suitable for upright or suspension fixing. Examples of the popular "Avil" "Sideway" lamp were shown on different types of bracket. This is a lamp for Group "B" roads, available in sizes from one to four mantles, both the examples being in the latter size.

Also exhibited were lamps of the "Arcturus" and supported "Arcturus" types, available in sizes from one to fifteen mantles, suitable for Group "A" or "B" roads. The fifteen-light "Arcturus" lamp was shown with constant pressure governor, Newbridge controller, "Staybrite" steel reflector, and Holophane dish refractor. In addition there was shown the "Avil" "Standard" square lantern with four-light No. 2 cluster burner reflectors in "Staybrite" steel, with Newbridge controller and "Comet" igniter. A sectioned "Standard" lamp revealed the sturdiness of construction and workmanship typical of all "Avil" products.

Two reinforced spun concrete lamp standards—one having a mounting height of 25 ft. for Class "A" lighting, and the other a mounting height of 15 ft. for Class "B" lighting—were erected by the **Stanton Ironworks Company, Ltd.,** outside the Exhibition Hall.

The Stanton centrifugal process of manufacturing concrete products has been known for a number of years; now the Stanton Company draw the attention of lighting engineers to the special advantages of the process as applied to the manufacture of lamp columns. The action of spinning naturally produces a very dense concrete, and by careful control and choice of mixtures it is possible to produce columns which can be subjected to various mechanical processes, thus producing artificial stone surfaces which are absolutely permanent. The exhibits showed the standard having the appearance of smooth granite. The columns were taken out of the large stock available at the works, and had not received any special treatment. Various other stone finishes and colours, all guaranteed to be permanent under ordinary working conditions, are available.

Lamp columns were also exhibited by **Concrete Utilities, Ltd.,** in Braidley Road, beside the Town Hall. This firm has had many years' experience in the design and manufacture of concrete lamp columns and now has many thousands erected in this country and abroad.

The **Bromford Tube Company, Ltd.,** were exhibiting two types of seamless tubular steel lamp columns. One was the most used type of column for a 25 ft. mounting height, and was equipped with a right-angle bracket which can be produced in various projections to conform to M.o.T. requirements. It is suitable for gas or electric lighting, and there is ample room in the base for either type of gear, the steel tube forming the actual base. This measures 8½ in. outside diameter, which occupies the minimum amount of space on the pavement. The other column exhibited had the same base accommodation, but showed a new design of curved bracket. This is also suitable for a 25 ft. mounting height, and can be supplied in various projections.

Of the two tubular steel lighting columns exhibited by **Stewarts & Lloyds, Ltd.,** one was a gas lighting column, 35 ft. long. This column gives an effective mounting height of 25 ft. with a 6 ft. outreach in accordance with one of the recent recommendations of the Ministry of Transport. The columns are of steel throughout.

The gas column is of the reservoir type, which has been supplied to many authorities. The reservoir principle is that the column itself conveys the gas from service connexion to lamp, eliminating internal piping or connexions. On the gas lighting column was one of C. H. Kempton & Co., Ltd.'s, 10-light "Majestic" lamps with multiplane reflectors supported by the "Wask" gear of Walter Slingsby & Co., Ltd.

Columns of a large variety of designs to suit all requirements of height and outreach can be supplied.

THE BOURNEMOUTH CONFERENCE OF THE Association of Public Lighting Engineers

The 1938 Conference of the Association of Public Lighting Engineers was held in Bournemouth from Monday, Sept. 5, till Thursday, Sept. 8. There were more than 600 delegates from various parts of the United Kingdom in addition to many ladies, and a varied programme of Papers and entertainment had been prepared.

After the Fifteenth Annual General Meeting on the Monday, when the new President—Mr. C. H. Woodward (Bournemouth)—was inducted to the Chair, the Exhibition of Public Lighting Equipment was opened by Councillor H. A. Benwell (Chairman of the Bournemouth Lighting and Fire Brigade Committee. On the Monday evening there was a Reception and Dance at the Pavilion by invitation of His Worship the Mayor of Bournemouth (Mr. J. B. Beale). On the Tuesday the Association was given a Civic Welcome in the Town Hall by His Worship the Mayor of Bournemouth, after which the new President gave his Presidential Address. The Bournemouth Gas and Water Company entertained the delegates at Luncheon in the Pavilion and two Papers were also read on this day. In the evening there was a Conversazione at the Exhibition Hall which was followed by a Supper Dance and Cabaret by invitation of the Chairman and Directors of the Bournemouth and Poole Electricity Supply at the Royal Bath Hotel.

Further Papers were read on Wednesday, and the Annual Banquet and Dance was held at the Pavilion in the evening.

The Conference concluded on Thursday morning, when the final Paper was read, and in the afternoon there were motor-coach excursions.

ANNUAL GENERAL MEETING.

Mr. C. I. WINSTONE (the retiring President) presided at the Annual General Meeting which was held in the Town Hall on Monday afternoon, Sept. 5.

Referring to the past year, he said unfortunately the Association had suffered several serious losses. Mr. E. M. Severn, a past President, had passed away six or seven weeks after the last Conference. They had also lost Mr. Beveridge, who was President in 1931, and Mr. Hepple, of Newcastle, three men who had done an enormous amount of work for the Association. Continuing, the President said that Mr. Forbes, of Aberdeen, who was President in 1934, had retired, and Mr. Sellars, of Manchester, had resigned from the Council. At the same time, although the Association was suffering losses in this way, it was rapidly increasing its membership, the increase amounting to about 50 per annum.

Referring to the Annual Report, the President expressed his appreciation of the valuable work done during the past year by the members of the Council, and specially mentioned the efforts of Mr. Wilkie, of Leicester, in regard to the education scheme, and Mr. Lennox, of Newcastle-on-Tyne, who had taken out a large number of figures relating to the cost to various municipalities if they adopted the report of the Ministry of Transport on street lighting. This huge schedule had been sent with an appropriate letter to the Minister asking him to give it consideration. They had received the usual Ministerial reply, with which, however, the Council was not satisfied, and they proposed to take further action in the matter. Also in relation to street lighting the President mentioned that the Ministry of Transport had suggested that any columns erected in connexion with the lighting of trunk roads should have the approval of the Fine Arts Commission before the Ministry would pay a grant towards the erection of any installation. The Association had been made the medium for dealing with designs, and practically all the steel people and the concrete people had now submitted drawings which had been considered by the Association. Some time during this month they were to be shown to the Fine Arts Commission, who, it was assumed, would approve or reject after consideration of each design. In this way the manufacturers, in tending for installations in the future, could say that a particular design had received the approval of the Fine Arts Commission.

Referring again to the Education Scheme, the President called upon Mr. Wilkie to give some information with regard to it.

Education Scheme.

Mr. T. WILKIE (Leicester) recalled that at the Cheltenham Conference of the Association a draft syllabus for an educational scheme in public lighting was submitted and formally approved. Subsequently, however, other Associations became interested, and a general scheme for education in illumination, with public lighting as a specialized section, was drawn up. A meeting was held of a large number of Associations which appointed an Advisory Committee, and eventually a scheme was drawn up for an intermediate and final examination, the final being divided into section A and section B. The idea was that those entering for the intermediate would already have reached a certain standard and having passed the intermediate they would be able to choose either section A or section B in the final. Section A might be regarded as general and section B had particular reference to public lighting. The intention of the Council of the Association was to give a Diploma to those candidates who passed section B and this Diploma would be regarded as the highest hallmark of efficiency.

Remarking that he considered this development in education for public lighting would be of the greatest value to the younger members of the profession, Mr. Wilkie said that although there might be some who did not consider the scheme all that it might be from the public lighting point of view, he asked them not to condemn it but to support it as a start in this very important matter, in the knowledge that as time went on the syllabus would be modified and improved to suit conditions. He further urged members to help in persuading local technical schools to start classes, and mentioned that already in one or two towns the technical schools had taken the matter up enthusiastically. Incidentally, Mr. Wilkie mentioned that the Council was considering the constitution of the Association, and said that personally he felt that some provision should be made in any new constitution for members who had passed the necessary examinations and held the Diploma. Although it had been said by some that in this scheme the Council was aiming too high, the view was that a Diploma which could be obtained too easily was of no great value. Mr. Wilkie concluded with a request to the members generally to assist the scheme by making suggestions from time to time, because he believed that in a few years it would put street lighting in the place it ought to have as a necessary department of municipal government.

In reply to a question, Mr. Wilkie said that the examination to be held next year would only be the intermediate under the auspices of the City and Guilds Institute. No final would be held next year. He added that in Leicester there was already a class of people who hoped to sit for the Intermediate next year.

New Officers.

The PRESIDENT reported that, as a result of the ballot, Messrs. E. C. Lennox (Newcastle-on-Tyne), J. H. Clegg (Southport), and J. F. Colquhoun (Sheffield) were elected members of the Council. It was also reported that Mr. E. J. Stewart (Glasgow) had been elected Vice-President.

The PRESIDENT, in asking his successor—Mr. C. H. Woodward (Public Lighting Engineer, Bournemouth)—to take the Chair, spoke with appreciation of the manner in which the members of the Council had supported him during his year of office and made his task a most enjoyable one.

First Lighting Scheme under 1936 Act.

Mr. C. H. WOODWARD, taking the Chair, expressed his sincere thanks for the honour which had been conferred upon him and remarking that he looked upon the Association of Public Lighting Engineers as a young and very energetic body; he said he would exercise his very best endeavours to further the interests of the Association.

Councillor G. SYMINGTON (Glasgow) extended a hearty invitation to the Association to hold its Conference next year in Glasgow. The President thanked him, and said the invitation would be considered by the Council in the usual way.

Continuing, the President said the members would no doubt be interested to hear that the first lighting scheme under the Trunk Roads Act, 1936, which empowered the Minister of Transport to make grants for approved lighting of trunk roads, would shortly come into being as the result of negotiations between the Earley Parish Council, the Berkshire County Council, and the Ministry of Transport. Sodium lighting had been chosen for this new

scheme, which would cover a mile of the London Road through Earley to the outskirts of Reading. The opening ceremony on Oct. 17 would be attended by a large gathering representative of highways authorities and the various Associations concerned with lighting, road transport, and road safety. The occasion would be particularly significant as marking the first direct financial assistance by the Government towards securing greater road safety through the medium of efficient trunk road lighting.

GUESTS OF THE BOURNEMOUTH GAS AND WATER COMPANY.

On the Tuesday the delegates and many guests were entertained at luncheon at the Pavilion by the Chairman and Directors of the Bournemouth Gas and Water Company. Lieut.-Col. H. W. Woodall presided.

The CHAIRMAN, proposing the toast of "The Association" and coupling with it the name of Mr. C. H. Woodward (President of the Association), first apologised for the absence of Mr. William Cash, Chairman of the Bournemouth Company, who had made a special journey from Scotland to attend but had been prevented at the last moment owing to the serious illness of his wife.

Gas supply, continued the Chairman, including public lighting, was commenced in Bournemouth 70 years ago, and the supply of electricity began in 1888. Since those times the areas supplied by the two companies had considerably altered. In 1888 the gas supplied by the Bournemouth Company amounted to 131 million cu.ft., but last year the quantity had risen to 3,250 million cu.ft. As regards public lighting, 5 years ago the Bournemouth Gas Company supplied 7,929 public lamps but in 1937 the number had risen to 10,222—an increase of 28%. This street lighting by gas covered a length of over 384 miles of roads, and practically the equivalent of 10,000 tons of coal was being used per annum to produce the gas utilized.

Referring to the Association, the Chairman said that since it was formed some 15 years ago it had carried out its important duties with an efficiency that well warranted the success it had attained, and Bournemouth was proud that the Association had come there for the second time. The last occasion was in 1929, and it was interesting to notice how every year added to the interest of the Conferences and the scientific value of the matters discussed. The original gas lamp had been replaced by high power lamps supplied with clock and other controls, with solar dials that followed the sun so that no re-setting was required from week to week, and refractors and reflectors were used to distribute the light in any required direction. The electrical industry, too, was constantly bringing out new and improved lamps, and no doubt everybody would have admired, among other things in Bournemouth, the effective and artistic displays of lighting arranged by Mr. Woodward on the piers, the sea-front, and in the public gardens. Nevertheless, great as had been the improvement in public lighting in recent years, he felt that the Association might well devote some attention to the lighting of villages on the public highways. He knew of several places where one suddenly came on to a very brilliant light, set high up, which forcibly attracted the eye and dazzled it, thus adding to, instead of diminishing, the dangers of motoring when passing from badly lighted country villages into more brilliantly lighted byways. In this connexion he mentioned that some friends of his were called in to advise on the lighting of a tunnel on a motor highway near the Bois de Boulogne, where frequent accidents were occurring, and the trouble was overcome quite successfully by increasing the lighting in proportion to the degree of sunlight and so reducing the contrasts to which the pupil of the eye had previously been unable to adjust itself. The means adopted were ingenious. A sensitive cell was mounted high in the air and fully exposed to the sunlight and by means of relays the cell automatically turned more lights on or off in accordance with the increased or diminished brilliance of the day.

Looking back to old times, the Chairman said he would like to try to bring home the immensity of the problems and of the responsibilities with which the two great industries of gas and electricity were entrusted, and the importance to their mutual relationship brought about by the formation of the Association of Public Lighting Engineers. Starting as ordinary commercial undertakings, these two industries had developed year by year until within the last quarter of a century they had become an integral part of the daily life of the country, the dislocation of which would, at any rate temporarily, create complete chaos in the national social structure. Taken together the two industries could claim that they came next to farming in their importance to the national well being, and he believed that as time went on the tendency must be for them to draw closer and closer together. It should be a source of pride and satisfaction to the Association to note that, whereas the Gas Industry had been in existence for 140 years and the electrical industry for about half that time, it had been left to the Association of Public Lighting Engineers to forge the first link in uniting these two great industries in one common effort.

Finally, the Chairman referred to the President of the Association, Mr. C. H. Woodward, the electrical and public lighting engineer to the Bournemouth Corporation. Mr. Woodward had been a pillar of strength to the Association, and had made valuable contributions to the proceedings, culminating in the splendid Presidential Address he had delivered that morning. In Bournemouth they were proud of Mr. Woodward as a citizen and pleased to see him occupying the distinguished position of President of the Association of Public Lighting Engineers.

The PRESIDENT, responding to the toast, said that he was delighted personally to have this opportunity of making reference to the very great debt which the Gas Industry owed to Col. Woodall. Special reference ought to be made to that great development on which he had worked in conjunction with the late Sir Arthur Duckham—namely, the vertical retort, which had conferred very great facilities upon the Gas Industry in producing good commercial gas. The Bournemouth Company's gas-works at Poole, which the delegates would have an opportunity of visiting, were a model of what a gas company's premises should be. Very frequently, particularly in the case of older gas-works, the buildings were dark and dull looking, and possibly were in a locality where circumstances had pushed them rather out of the way. At Poole, however, a very different state of affairs existed. The Company had taken land covered with tidal water which was apparently useless either to man or beast, and by dumping refuse on it and piling it they had secured a most valuable tract of land upon which they had built a model gas-works for which very great credit was due to the Company and their engineers.

Commenting on Col. Woodall's remarks with regard to public lighting, the President said it was the duty of the public lighting engineer to see that the streets were so lighted that it was possible for both pedestrians and vehicular traffic to move about during the hours of darkness with the same facility that was possible during daylight. Col. Woodall had made a plea for uniformity, just as he had himself in his Presidential Address, and the concentration of light in lanterns mounted at fairly high levels with fairly high magnification factors, which blinded a person approaching them, was to be deplored. A lamp might emit three times the amount of light given by a lamp previously in the same position, but the disability glare associated with that increase of light might reduce the effectiveness of the lamp by 50 to 60%, so why do anything if it were done wrongly.

In conclusion, the President expressed the appreciation of all those present of the hospitality which had been extended to them by the Bournemouth Gas and Water Company.

ANNUAL DINNER.

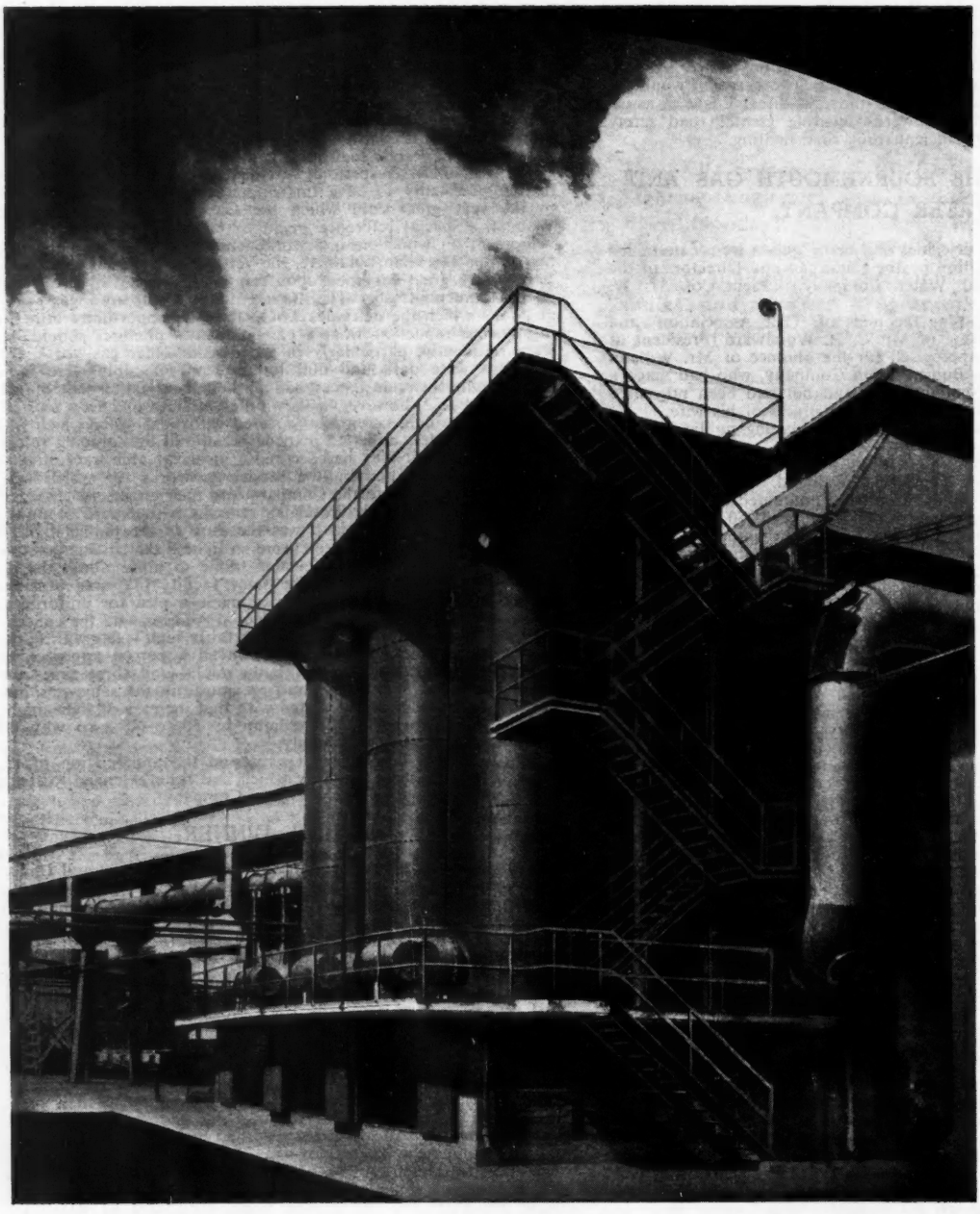
There was a large attendance at the Annual Banquet and Dance of the Association which was held at the Pavilion, Bournemouth, on the Wednesday evening. The President (Mr. C. H. Woodward) was in the Chair.

HIS WORSHIP THE MAYOR OF BOURNEMOUTH (Mr. J. B. Beale) proposed "The Association of Public Lighting Engineers" and said that in the President—Mr. Woodward—they had a Bournemouth man of whom they were very proud because during the last few years, and especially since the new Lighting Committee was formed, progress in street lighting in Bournemouth had been really remarkable. He thought it would be agreed that the main streets were brilliantly illuminated and Bournemouth people were grateful to the Committee which was responsible. He gathered that the public lighting engineers of the country owed a great deal to those two important industries, the gas and electricity industries, for the great assistance they had been in developing street lighting equipment, in making experiments and putting forward new ideas for street lighting. It was difficult to realize that within the lifetime of some of those present the old lamp-lighter had gone and that now means were being considered by which the whole of the street lighting could be controlled from the electricity generating station or the gas-works.

The PRESIDENT, responding to the toast, first read the following telegram which had been received from H.M. The King in reply to one sent to him by the Association during the Conference:

> "Please convey to the members and delegates of the Association of Public Lighting Engineers assembled in Conference the King's sincere thanks for their kind and loyal message."
>
> (Signed) PRIVATE SECRETARY.

Continuing, the President expressed the appreciation of the delegates to the Conference of the manner in which they had been received by the Corporation and emphasized the point that the Association confined its activities to one object only—*i.e.*, public lighting. He added that an educational scheme had been instituted to ensure that the members of the Association should be technically fully equipped to serve the public with the greatest efficiency, and concluded by remarking that the meetings of the Conference had been largely attended and that many new ideas had been forthcoming both there and in the Exhibition of Public



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Lighting Equipment which was held in conjunction with the Conference.

Mr. E. C. LENNOX proposed "The Guests" and the toast was briefly responded to by Mr. W. L. CLOWES (Borough Engineer and Surveyor, Bournemouth).

DISCUSSIONS ON THE PAPERS

The following are the main points from discussions which followed the Papers published in last week's "JOURNAL."

AIR-RAID PRECAUTIONS AND LIGHTING.

By Thomas Wilkie.

Mr. J. F. COLQUHOUN (Sheffield) said that on the part of his Paper dealing with the question whether there should or should not be a state of continuous darkness during a war, Mr. Wilkie was not on such good ground. Was he fair to the Air Raids Department of the Home Office to infer that full consideration had not been given to the points raised? Personally he was not in the Inner Councils of the Home Office, or any other Government Department, but he knew that enquiries regarding street lighting practice and conditions of supply had been made to various organizations. Mr. Wilkie argued that the comfort and safety that street lighting would give would go a good way to preserve public morale, but the Home Office said "No." With the speed of modern aircraft, and if an attack was to be directed at, say, Birmingham, it would be necessary to "black-out" the whole country from Land's End to John o'Groats. These "black-outs" when the public would know that an air raid was imminent at some part of the British Isles, were more likely to hurt public morale than a state of continuous darkness, to which the public would become accustomed. It was a problem in mass psychology, and his training and experience as a public lighting engineer in no way qualified him to assume that his opinion had any special value. Mr. Wilkie advocated central control of street lamps. But what was central control? Was it the whole of an area administered by one lighting authority, no matter whether that area was great or small, or was it an area of supply? If so, he wondered how London would go on. Did it include gas lamps as well as electric lamps? He doubted the possibility with gas supply. If Mr. Wilkie ruled out gas, as he appeared to, from his considerations, all street lighting which it was intended to continue during war would require to be electric street lighting, and it was stated in the Paper that the initiative should be taken by the Home Office. In that he was asking rather a lot from the Home Office.

Mr. F. C. SMITH (Gas Light and Coke Company) said that in regard to the Leicester exercises he had been surprised at Leicester at the ease with which drivers were able to negotiate the difficult route especially after they had become dark adapted. There appeared to be no reason why essential services should not proceed with reasonable speed and safety if provided with well-adjusted headlights of the type used at Leicester coupled with the use of the aids which showed most promise during the exercises. In the Home Office circular the statement was made that more precise particulars of aids to movement would be supplied as soon as possible, indicating clearly that the Home Office was actively engaged in considering the best recommendations to make in this respect and there could be little doubt that as a result of the Leicester and other exercises valuable guidance would be forthcoming.

Continuing, Mr. Smith said: "I regard the author's plea for a reconsideration of the restriction forecasting a complete and continuous blackout throughout the period of hostilities as introducing a highly controversial subject, especially as it is not possible to discuss such a matter of policy without the fullest knowledge of all the factors involved. I hope I am not unfair to the author when I say that there is a suggestion running through the Paper that the A.R.P. Department of the Home Office has taken the path of least resistance and issued this memorandum on lighting restrictions rather hastily without having given the fullest consideration to all the aspects involved or consulting other departments vitally concerned. He also goes so far as to suggest that public lighting in its relationship to home defence has been given less consideration than is desirable. It would be interesting to have the Author's evidence in support of this statement. It is generally accepted that this country has a body of permanent government officials of great experience and ability, and it is unthinkable that men of this calibre could possibly have advised the issue of this circular without having all the available facts before them and carefully weighing all the known considerations affecting public safety and convenience, the maintenance of morale, the needs of industry, and the general well-being of the country.

"As I see it there are four possible alternatives:

(1) Public lighting and indeed all lighting could be allowed to continue unrestricted.

(2) Restricted lighting could be permitted.

(3) Complete extinction throughout the period of hostilities.

(4) Extinction only enforced during the period of raids.

"I have heard the opinion expressed that the position and lay-out of towns are so well-known to a potential enemy and the aids to navigation have advanced to such an extent as to make any lighting restrictions ridiculous. This may be an opinion sometimes expressed by the man in the street, but I suggest that the Home Office are familiar with the Air Ministry view that it is more difficult to locate an object of attack when it and the surroundings are in darkness.

"The alternative of restricted lighting appears to be attractive. The question which had to be answered was whether it is possible to restrict or modify the lighting to such an extent as to rob it of any ability to aid the invader while it continues to give real aid to the populace. I have attended many experiments which were arranged jointly by the Home Office, Air Ministry, and the other departments concerned with a view to answering this question, and these clearly indicated that the degree of restriction that is necessary to avoid aiding the airmen renders the residual lighting of little or no value to the pedestrian or driver, and would involve almost identical aids to those necessary under complete blackout conditions.

"The author, however, does not advocate either of these alternatives. The real point of controversy is whether lighting should be extinguished upon the receipt of a warning and brought into operation immediately after the raid, or whether throughout the period of hostilities all lighting other than specially arranged traffic signals, &c., should be eliminated. Mr. Wilkie says that the absence of lighting does not automatically remove the danger ffom the air. I think this point is conceded by all, but clearly, as shown by the observations of the airmen after the Leicester and other experiments, the absence of lighting makes the airman's task more difficult and increases his risk since under these conditions, for the attack to be really effective, it involves flying at lower levels than would otherwise be necessary. Everyone will agree that a state of continuous darkness cannot be faced with equanimity. One might add that war itself and all that it involves cannot be faced with equanimity. An absence of light on our streets is probably one of the lesser inconveniences and dangers that the populace will be called upon to face during such a state of emergency. It may be useful, therefore, to enquire further into the practicability and desirability of the author's suggestion of centralized control with the object of lighting and extinguishing public lamps at will as circumstances dictate.

"The author states the Home Office circular indicates to him that there is no system of control at present satisfactory enough to fulfil the rigid requirements. I contend, however, that there is nothing whatever in the Circular which justifies this statement, and, further, assuming a system of 100% reliability to be available, it is doubtful if the principle of intermittent lighting and extinguishing is sound defensive tactics. To my mind the latter consideration has carried more weight with the authorities concerned than the question of the efficiency or otherwise of the various systems of control available.

"The author very rightly deprecates a discussion on the relative merits of the various systems of centralized control, and states there is a clamant need for a serious search for a perfect control system. It is well to remember, however, that this is not a new problem and that a number of firms have been working on this question for many years and have not spared time or expense to improve the reliability of their various systems. It is clear, therefore, that the problem is not a simple one even on a straightforward distributing system, although in fairness it must be stated that centralized control is operating on certain suitable networks for both gas and electricity with reasonable efficiency. In the very nature of things such gear must be delicate and complicated, especially when working on complex distributing systems fed from a number of supply points (a desirable state of affairs to ensure continuity of supply both under normal and war conditions). One is tempted to ask whether these delicate mechanisms are to be relied upon having regard to the disorganizing conditions likely to prevail during a raid. Moreover, it has been demonstrated that certain systems are not free from enemy interference since it is possible for well informed agents to superimpose high frequency currents on to the normal supply system and so bring street lighting into operation at will.

"The author has suggested that lights could be extinguished on receipt of a warning and lit up immediately the raid is over. Surely recent experience both on the Continent and in China suggests that a series of relay raids is probably the greatest danger of all. It is contended that the switching on and off street lighting installations over various parts of the country when fast moving aircraft is in the vicinity will at least complicate defence, and is unsound from this point of view. Further, the author suggests that for cities and towns which are not in the vicinity of centres of military importance the restrictions are somewhat drastic.

"I can well imagine a 'Puddlecombe-in-theMarsh,' to which restrictions have not been applied, becoming an excellent landmark for guiding the attack on some more important centre which is in the vicinity, and when we think of vicinity we must appre-

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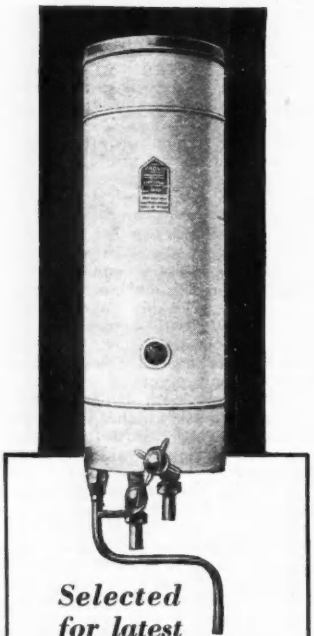

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"It is true, as the author has said, that certain cities such as London appear to be vulnerable. This fact must be obvious to the authorities who cannot have failed to take special precautions to protect these and other similar centres. The suggestion that inland towns and towns on the west coastal area do not need to be subjected to the same precautions as those on the eastern coast line presupposes that the attack will come from the east. In view of the speed and range of modern aircraft and the distance at which the glow from lighted cities is known to be visible from the air, why assume that the raiders must of necessity attack from the east?

A Counsel of Despair.

"The author has referred to the difficulty of screening blast furnaces, munition works, &c.—this appears to be a counsel of despair. It is within my knowledge that special experiments have been made to screen works presenting the greatest difficulty in this respect and that considerable success has been achieved. The Home Office has invited the co-operation of the various industries concerned. My own industry has been approached in this matter, and experiments have been carried out on gas-works with surprisingly good results.

"I was somewhat amazed to hear it suggested that any system of control should be made to operate street lamps, warning sirens, call out street wardens, fire wardens, call ambulance, contamination squads, sound the all-clear, and turn on street lamps. Surely it is inexpedient to rely upon all these essential services being operated by any one system. If such a system were put out of mesh by the enemy attack, confusion worse confounded would result. Of course, such a system may be regarded as a second or third string, in which case if the thing were economically, tactically, and technically sound and it is possible to operate any one service independently, there may be something in the idea.

"The suggestion that the control system should act as an auxiliary to the siren is to my mind less attractive. Auxiliaries to sirens are not wanted by night; they are more necessary during the day. In any case, it is debatable whether the immediate plunging of a city into darkness would not do more to undermine public morale and bring about a state of panic than the populace becoming used to the permanently darkened condition. The statement that some form of lighting will be absolutely necessary for rescue and de-contamination work is agreed, but it does not necessarily follow that this need be street lighting; indeed, the street lighting may be put out of operation as a result of the raid. Essential services would surely carry their own lighting and there is little doubt that some easement dictated by circumstances would have to be allowed to cars undertaking rescue work.

"Under the heading 'General Objections' I was surprised to read the paragraph dealing with social habits, &c. I am wondering whether the author has really visualized war conditions.

"It is amazing to read that there are certain systems of control which can be arranged to extinguish every light in the home and the factory if required. Surely this is a gross overstatement. It is sufficient to say that no one industry has the monopoly of lighting in this country and that no one system of control is applicable to all systems of lighting.

"The author makes a very real point in saying that hostilities may commence before a formal declaration of war. Very true. I think this point, however, can be over-emphasized, since it is difficult to believe that there will not be a condition of strained relationships before any untoward incident such as a raid takes place, in which case can we not rely on suitable precautions being taken in order to avoid the element of surprise?

"To return to the economics of control systems, the author states that the peace time labour costs of operating these systems will be considerably lower than the normal method and that in consequence they are financially attractive. I would like to have evidence in support of this statement. A general conclusion in this respect cannot be drawn from the cost of operation of any one control system operating on any given distributing network. Moreover, if the control is to operate satisfactorily, the capital costs involved would have to include in many cases expensive modifications to distributing systems, to say nothing of the capital involved for the apparatus.

"I agree, however, that the whole question of lighting restrictions is one upon which there is room for difference of opinion. In my view there is a great deal to be said for the decision which has been arrived at in the Home Office circular, and I would emphasize that I am sure that this decision was not reached without taking into account and giving full consideration to all known facts."

Mr. F. P. Crook (Wembley) said that during the last war the regulations governing street lighting permitted a cut-off of about 95°, which was brought about principally by painting the street lanterns. Although such a cut-off was of necessity very severe there was sufficient light for pedestrians to find their way about and for vehicular traffic to move with a margin of safety. In his judgment to extinguish all lights during an air raid would create more panic and chaos than would the actual falling of bombs, and to imagine people in the streets in complete darkness trying to find a place of safety was simply preposterous.

Councillor H. A. Benwell (Chairman, Lighting and Fire Brigade Committee, Bournemouth) also expressed the view that the greatest danger in air-raids would be panic, and said it was up to the manufacturers to devise a system of control of street lighting during air-raids which would show up kerbs and generally permit pedestrians and vehicular traffic to move about with a reasonable degree of safety. He further expressed the view that the Government should provide grants to local authorities towards providing such systems of street lighting control.

Mr. Wilkie in a brief reply to the discussion, said he agreed the whole subject was a provocative one and added that it would be better for him to reply to the many points raised by Mr. Colquhoun and Mr. Smith at some other time. The whole problem of mass psychology came into consideration and he was not prepared to argue about that. So far as central control was concerned, he had in mind a system of group control or unit control distinct from time switches and so far as he was aware this could not be adopted with gas. The system of street lighting control in use in Leicester had operated with an efficiency of 98·8%. Finally, he said that his Paper had been in the hands of the A.R.P. Department before being issued and had now appeared after certain alterations had been made by the Department. Nevertheless, it was put forward as containing his own views and he had no desire to bring anybody else into it. He was still thoroughly convinced that a system of control could be found and as soon as this was available, the better for everybody concerned.

PUBLIC LIGHTING BY GAS IN SMALL TOWNS.

By W. Hodkinson.

Mr. Hodkinson, in some additional remarks in introducing the Paper, said that, with regard to the question of instantaneous extinction of gas lighted lamps in relation to air-raid precautions, he was amazed and, indeed, somewhat amused, to find that instantaneous extinction was considered a problem yet to be solved in connexion with gas lighting. Actually, lighting and extinguishing gas lamps by means of a pressure wave control was in use many years ago and was still in use to-day in many parts of the country with complete success.

Discussion.

Mr. Ronald Parker (Aberdeen) commended the efforts of the Author's Company to provide a consulting service for the smaller authorities. This was a step in the right direction although he considered that lighting authorities should themselves get together to provide some joint consultative means for checking their installations and ensuring reasonable equipment so far as was possible within the finances available. The first step in that direction should be to persuade the Government to alter the law with regard to lighting and also to provide some grant for the lighting of the main roads which must be lighted according to the M.o.T. Report, to standards which were considerably in excess of local requirements as they had to deal with through traffic to such a large extent. The M.o.T. Report suggested that attempts should be made in this direction, but it rested with the local authorities to persuade the Government to amend the law before anything could be done. Although numerous installations appeared to be giving an output of light which was well within the recommendations for Class A roads, he felt that the Gas Industry as a whole had been too prone hitherto to put in schemes which were only just slightly more than the 3,000 lumens per 100 ft. linear which, in his view, was a great mistake because their opponents were putting in a much larger amount of light and, after all, it was the amount of light which determined the quality of the lighting to some extent and it would be better to work as a general average to about 5,000 lumens per 100 ft. linear instead of 3,000. While congratulating the Gas Industry as a whole on providing many installations which could be maintained at a high standard of efficiency he complained that the Industry was not sufficiently ambitious as regards main street lighting schemes.

Mr. K. F. Sawyer (Gas Light and Coke Company) said he was sorry to hear, running through the discussion on the previous day with regard to air-raid precautions, the suggestion that the Gas Industry was unable to satisfy the requirements concerning centralized control, but the fact was that the Gas Industry had centralized control many years before it was applied to electrical methods. Burton-on-Trent should be instanced as having had centralized control for many years and it was still working. It would also be remembered that about three years ago Herr Adolph from Berlin described before the Association the Berlin installations where both gas and electric street lighting was controlled according to the natural illumination prevailing at the time. The whole of the street lighting in Berlin was dealt with in this way, and it was interesting also to note that in Berlin they were relying on total extinction during air-raid periods and not on intermittent lighting. Commenting on the remarks by Mr. Parker with regard

to lumen output, Mr. Sawyer said the Gas Industry realized that siting was more important than the mere provision of lumens. If the lumens were applied skilfully an installation could be carried out just as satisfactorily very often with a smaller number of lumens. The Gas Industry had been very successful in carrying out a number of installations to the requirements of the M.o.T. Report and had demonstrated that adequate siting was a primary consideration.

Councillor JACKSON (Scarborough) claimed that Scarborough was the best gas lighted town in England, and he felt bound to say that there had never been a more energetic undertaking than the Scarborough Gas Company, which not only gave service but also full value for the money paid. Great attention was paid to maintenance and it was in this direction that the greatest value was to be obtained.

Mr. W. E. GREENHALGH (Bury) said that the figure given in the Paper of 0·25 cu.ft. of gas per hour as the consumption of a by-pass was a startling one to him because for many years his authority had been paying ½d. per day for by-passes which amounted to a substantial sum in a year. Indeed, the cost in this connexion had become so great that he had taken it up with the local Gas Engineer and arranged for scientific measurements of by-pass flames in order to arrive at a consumption which would be satisfactory to both sides. A consumption of 12 cu.ft. per day meant that the by-pass light was no larger than the black end of a match and as this consumption was 100% more than that mentioned by the Author, he would like to know what the by-pass referred to in the Paper looked like and how it operated in windy or rough weather.

Councillor B. DAVIS (Solihull) discussed the problem of finance in lighting roads especially in the case of the smaller authorities particularly for what he termed service roads as distinct from trunk roads and said that, although discussions were taking place at the present time between the representatives of various Associations, local authorities, and the Ministry of Transport with regard to responsibility for the future maintenance of roads, so far as he was aware no consideration had been given to the question of lighting these service roads. He contended that the Treasury should be responsible for the lighting of service roads along the main roads, and suggested that the Association should bring the matter to the Ministry of Transport.

Mr. H. HAMER (Bolton) said that the illustration in the Paper of the street lighting in Denton completely failed to do justice to the installation for he had never seen a better example of low-pressure gas lighting anywhere. Incidentally, he asked for some figures as to cost per mile of roadway. Referring to centralized control, he said that in his area there were over 5,000 gas lamps working with pressure wave control and for some 300,000 actuations, the failures each month were only about 0·06%. He had given special study to this question and the gas undertaking was quite prepared to supply the extra pressure required to actuate the control. There were some hilly districts in the area but the difficulties in that respect had been overcome.

Mr. C. H. UNDERHILL (Burton-on-Trent) speaking with regard to pressure wave control said that from his experience of air-raids many years ago he could confirm what Mr. Greenhalgh had said with regard to the necessity for plenty of light after an air-raid because even if panic did not prevail, curiosity would bring a large number of people into the streets. In Burton-on-Trent the pressure wave control system normally worked at 99% efficiency. Perhaps it was not surprising that many people would not believe that this efficiency could be obtained but it had been checked by Mr. Winstone and others who themselves had been surprised at the efficiency of the pressure wave system.

Mr. C. I. WINSTONE (Gas Light and Coke Company), speaking of the cost of lighting streets either by gas or electricity in conformity with the M.o.T. recommendations, said he knew of one small local authority where a penny rate brought in only £30 a year and there were five miles of road to administer. In another case, a penny rate brought in £50 and there were three miles of road to administer. It was obvious, therefore, that many local authorities could do nothing at all to improve their street lighting and it was necessary that something should be done to persuade the Home Office or the Ministry of Health to make grants to these poor local authorities. In these instances 90% of the traffic which used the roads never paid a tax or a rate in the district at all. On the question of cost also there was one aspect which was not often brought out—*i.e.*, the lumens on the road. The M.o.T. Report recommended that the illumination of trunk roads should be between 3,000 and 8,000 lumens per 100 ft. linear. He did not know whether anybody had seen a road lighted with 8,000 lumens but he had seen one lighted with 6,500 and another with 3,500 and although he had normal eyesight he could not see that the other 3,000 lumens made any difference to visibility. Of course, it all depended on the type of installation but there were many cases in which it was no use pushing up the lumens because visibility was not improved if the installation was scientifically arranged. These additional lumens had to be paid for and there was no reason why 7,000 or 8,000 lumens should be used if 4,000 lumens would do the job as well as was necessary. With 3,500 lumens it was possible to see a quarter of a mile down a road and surely nobody wanted to see farther than that. Therefore, it seemed to him that in going to 7,000 or 8,000 lumens as suggested in the M.o.T. Report, money was being spent unnecessarily.

Mr. C. R. SMITH (Castleford) referring to the contracts for 10 and 15 years mentioned in the Paper, asked whether any provision had been made for modifying the contracts in order to take advantage of progress as it was to be assumed that considerable progress would be made in street lighting methods over such periods. He also asked whether the gas was paid for separately or whether there was an all-in charge per lamp and did the charge cover maintenance. With regard to by-passes, he said that a 0·25 cu.ft. per hour by-pass was larger than the black end of a match-stick, mentioned by Mr. Greenhalgh. Continuing, Mr. Smith said he was an engineer and surveyor but had had given to him the task of looking after the street lighting. The position was that small urban district councils could not afford to have a separate public lighting engineer and in such cases he was inclined to think that the average engineer and surveyor could do the work quite well. He had a knowledge of physics, chemistry, and mathematics and occasionally he had a little common sense. If he tried very hard he could understand an onion diagram and, after all, even in reasonable size towns it was not necessary to be constantly designing new installations. Therefore, in small towns he suggested that the engineer and surveyor could quite well undertake the duties of public lighting engineer. In this connexion he joined issue with the Author in the impression he gave, in discussing maintenance and service, that the cure for all the troubles of local authorities as regards street lighting was to place the matter in the hands of the gas undertaking. A small seaside town was mentioned in the Paper in this connexion but it was not stated whether this particular place had an engineer and surveyor or not or whether he was brought in to advise. Nor was it stated whether the gas undertaking charged for the maintenance which, however, he presumed was the case.

Mr. JAMES CARR (Stretford and District Gas Board) said he had carried out experiments with by-passes which burned 6 to 8 cu.ft. per day and could not understand why Mr. Greenhalgh should speak of the necessity for a consumption of 12 cu.ft. per day. There must have been something wrong with the meter used. Referring to pressure wave control, he said his Undertaking had had it for a number of years and it had operated very satisfactorily. Continuing, he complained of the apathy of small local authorities towards experimental installations erected by the gas undertakings. Very often such experimental installations were installed for the inspection of the local authority but they were not even considered. Fortunately, during the past 12 months local authorities were taking greater interest in this respect and it was to be hoped that this attitude would extend to a much larger number of these authorities. Commenting on air-raid precautions, Mr. Carr suggested that everybody was talking of what would be done in air-raids without a great deal of knowledge. For instance, nobody knew, and the authorities could not say, for what periods bombing would take place. One speaker had referred to a few minutes but he remembered an air-raid during the last war which started at 7 at night and went on until the early hours of the morning. Therefore, they should be guided to a considerable extent by the Home Office on what they were expected to do.

Mr. Hodkinson Replies.

Mr. HODKINSON, replying, said that one of the objects of the United Kingdom Gas Corporation was to provide a consulting service especially for small local authorities. It was realized that with modern developments, lighting services required specialized attention which small gas undertakings could not possibly give and the United Kingdom Gas Corporation had made available the services of consultant specialists for the companies controlled by the Corporation. With regard to the point made by Mr. Parker that the Gas Industry was too prone to put in schemes which only just met the requirements of the M.o.T. Report, Mr. Hodkinson said that in the schemes he had mentioned in the Paper it had been necessary to go on the lower scale because the local authorities concerned could not possibly afford to have 5,000 or 6,000 lumens per 100 ft. linear, whether it be gas or electricity. He agreed that side street lighting had been neglected and felt that the M.o.T. Report had added to that neglect for it had caused attention to be focused on main road lighting. Indeed, to-day, side street lighting was even more neglected than it was two years ago. He thanked Mr. Sawyer for enlarging on the question of centralized control with regard to street lighting by gas and also agreed with Mr. Sawyer's views that lumens output was not a criterion of efficiency and that siting and positioning of the lamps was more important.

In thanking Councillor Jackson for what he had said with regard to the street lighting by gas in Scarborough, Mr. Hodkinson remarked that the Scarborough Company was controlled by the United Kingdom Gas Corporation which was so proud of the lighting there that it looked upon Scarborough as a show place from that point of view. Although Mr. Greenhalgh regarded a

consumption of 0·25 cu.ft. per hour for a by-pass as low, he was able to supply Mr. Greenhalgh with such by-passes which were extremely efficient and gave no trouble from blow-outs or anything like that. He agreed with Councillor Davis that it was hopeless to expect small authorities to light their main roads and their by-roads to the M.o.T. recommendations. It was true, as Mr. Hamer had said, that the illustration in the Paper did not give a true representation of the efficiency of the Denton lighting installation. It had also been his experience, as it had been Mr. Hamer's, that the percentage of failures on the pressure wave system was extremely low. In this same connexion he was pleased to hear what Mr. Carr had said, having worked under Mr. Carr two or three years ago. Pressure wave control had been perfectly satisfactory in Stretford but for several reasons not connected with public lighting there was a change-over but if the necessity arose that gas lighting should be capable of instantaneous extinction, it could be done without any trouble.

After remarking that the efficiency of the pressure wave control system at Burton-on-Trent was well known, Mr. Hodkinson replied to Mr. Smith and said that the charges in the contracts mentioned in the Paper included gas and maintenance, and in one case the repayment of capital, but all the contracts for 10 or 15 years were subject to review at the end of 5 years, because it was realized that advance in the future would be as great as it had been in the past. Therefore, no attempt was made to tie down any local authority for 10 years or more without giving them the opportunity of reviewing the position. The constancy of supply also mentioned by Mr. Smith, had been given considerable attention during the past five years because it was to the advantage of gas undertakings to maintain both the constancy of supply and quality. In the development of gas for industrial purposes it was absolutely vital that the gas should be of constant quality and constant pressure and the same applied to street lighting. As regards the qualifications of a public lighting engineer, and the suggestion in the Paper that small local authorities should take advantage of the services of lighting engineers employed by their larger neighbours, he did not infer that Castleford should go to Bradford or some other place. As a matter of fact, Castleford was one of the large authorities so far as the United Kingdom Gas Corporation was concerned, and in speaking of small authorities he had in mind the small village and small borough council. As to gas undertakings taking control of the public lighting, in nine cases out of ten the staff of the gas undertaking had more than sufficient experience to take over this work. It was their job to give good service and so far as the small village authorities were concerned, he honestly believed that they could get better service at the lower cost by handing over the maintenance, at least, of the public lighting to the gas undertaking.

He thanked Mr. Carr for confirming the figure in the Paper with regard to by-pass consumption, and agreed with the suggestion that probably Mr. Greenhalgh's meter was at fault. It was extremely difficult to get a meter to measure small by-pass consumption unless it was in good condition.

Finally, in reply to Mr. Hamer's question as to cost, Mr. Hodkinson said it was very difficult to give the cost of any installation by way of comparison. There were the questions of hours of lighting, size, &c., all of which varied throughout the country. As a matter of fact, he had not with him the information concerning the costs of the installation described in the Paper but would be pleased to give full details of the contract conditions.

Pioneer Work on Gas Controllers

An Old-Established Bournemouth Firm

Delegates to the Conference of the A.P.L.E. must have felt particularly grateful for the choice of venue this year—Bournemouth, "the" holiday resort of the South. It is interesting to note that the factories of the British, Foreign, and Colonial Automatic Light Controlling Company, Ltd., are situated in this delightful town, and the progress of this firm can be coupled with the growth of Bournemouth.

As long ago as 1899, Bournemouth installed the first batch of Gunning's "Gunfire" Gas Controllers, and has continued as one of the many satisfied users right up to the present day. It is always interesting to look back to the early days of any place, individual, or firm which has made progress, and in this respect it would not be out of place to recall the birth of the first "Gunfire" controller. It was in 1897 that the late Mr. John Gunning first began his experiments in the clockwork control of gas street lamps, for at that time he was Chairman of the Bournemouth Lighting Committee, and in that capacity it occurred to him that a considerable saving in gas and labour could be made if a clock could be adapted to actuate the tap of a gas lamp. With this idea the first controller was made, and it consisted of a clock which only turned the gas off, but by persistent experiment and determination the great trouble of procuring suitable clockwork in the early days was overcome, and the next move of importance was the introduction of a model to turn the light "on" as well as "off." This was done by fitting an 8-day clock with a dial to revolve once in 24 hours, and by fitting movable cams to the dial and the clock to the gas tap, it was possible to turn the gas on or off at pre-selected times as long as the clock ran.

From this stage the life-story of the "Gunfire" controller has been one of continued improvement in detail, but the original proved principle is still retained. Of course, one thing leads to another, and the gas controller was adapted to perform any duties peculiar to gas lighting such as multiple lights, sections, and dual controls. The essential feature of the "Gunfire" is that it is of simple mechanical construction, strong and reliable, and of the best quality materials and workmanship. Its success is largely due to its simple mechanism, and above all there is the saving of labour costs on maintenance.

Among the earliest towns to adopt the Gunnings controller can be mentioned Exeter, Oxford, Folkestone, Bournemouth, Andover, Hemel Hempstead, Huyton, Wembley, West Hartlepool, and in 1907 the makers published a list of over 100 places that had installed them in fairly large numbers. To-day, we are informed, there are many hundreds of thousands "Gunfire" controllers in daily use, and under every possible condition.

Radiation Limited

The Directors of Radiation Limited have declared an interim dividend on the ordinary stock of 7½d. per share (3¾% actual), less tax (same), and an interim dividend on the 6% cumulative preference stock of 3% actual, less tax, for the half-year ended June 30, 1938. Dividend warrants for both classes of stock will be posted on Oct. 15, 1938.

The Transfer Books for both classes of stock will be closed from Sept. 9 to 19, 1938, both days inclusive.

Cakes for Queen Mary's Tea

During her tour of the Empire Exhibition, Glasgow, Queen Mary visited the model kitchen of the Women's Gas Council in the Pavilion of the Women of the Empire. Her Majesty admired the kitchen and the food displayed on the table. Princess Alice, Countess of Athlone, who accompanied the Queen, asked about the Women's Gas Council. Mrs. Richardson and Miss Joan Hegarty, of the Women's Gas Council, and Miss Harris, of Messrs. Sidney Flavel & Co., Ltd., were on the stand. In the morning they had made cakes for the Royal tea-party. These were prepared in the model kitchen, and baked in the gas cooker there.

The Future of Airdrie Gas Undertaking

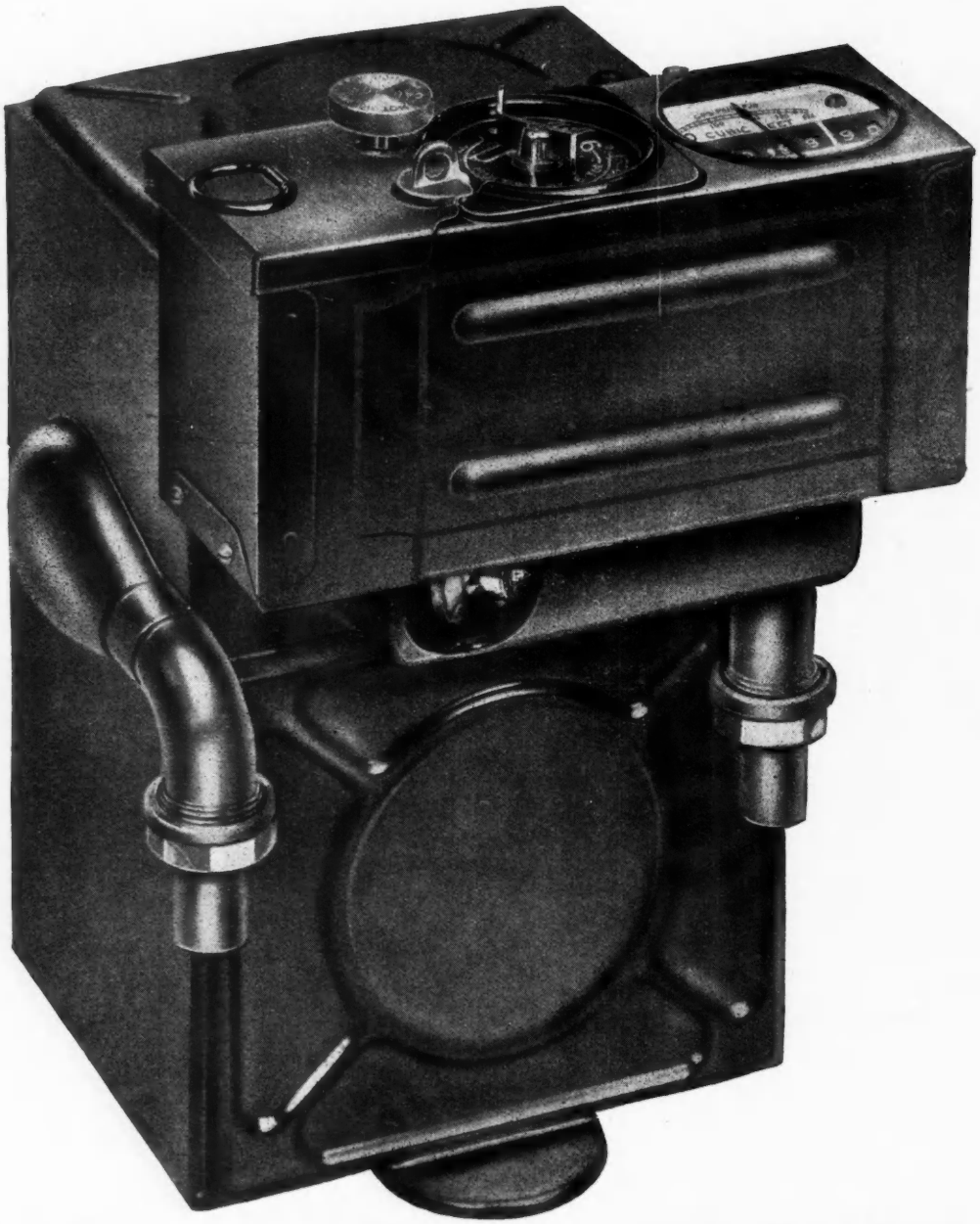
At Airdrie Town Council meeting on Sept. 1 Dean of Guild Thom moved that at the next meeting he would propose that the Council rescind their previous decision to erect new plant at their Gas-Works and enter into negotiations with Coatbridge for the sale of the Undertaking to the Coatbridge Gas Company on the basis of their most recent offer.

It will be recalled that the Town Council recently rejected an offer by the Coatbridge Gas Company to acquire the Works on payment of £20,000, the amount of debt outstanding against Airdrie Gas Department, the Coatbridge Company agreeing to supply Airdrie with gas at 8·4d. per therm as against the present rate of 1s. 0½d. The Council agreed to modernize the Undertaking by installing new plant at a cost of over £20,000, the Secretary of State for Scotland being asked to sanction the borrowing of the necessary money.

The Town Clerk reported that on applying to the Scottish Office, as instructed, he had been informed that the Commissioner for Special Areas in Scotland had notified the Secretary for Scotland of developments that might affect the construction of new works by the Airdrie Town Council. Thereafter consideration had been given to a suggestion that Airdrie might be supplied with gas by Messrs. Baird & Co., Ltd., Gartsherrie Iron Works, Coatbridge. The latter Company had not been able to state definitely when they would proceed with the necessary construction of blast furnaces and the erection of coke ovens at Gartsherrie, and it was decided that no good purpose could be served by further negotiations with the Company. The Town Clerk was therefore instructed to point out that the retort bench at the Gas-Works was showing signs of breaking down; that a monthly loss of £200 was being incurred through the obsolete condition of the plant, which would shortly reach a stage when it would be unable to produce the gas supply needed; that Messrs. Baird's proposals were indefinite; and that sanction to borrow the necessary money for new vertical retorts should be given forthwith.

In view of the position as set forth by the Town Clerk Dean of Guild Thom gave notice of motion as stated.

SMITH METERS, LIMITED



HOTEL METERS OF DISTINCTION
EASY TO FIX — EASY TO OPERATE
EASY TO ORDER FROM STOCK

PHONE : REL (LONDON) 2447-8-9

Markets and Manufactures

Current Sales of Gas Products

The London Market

LONDON, *Sept.* 12.

Prices of Tar Products generally remain unchanged at the following levels:

Pitch nominal at about 33s. per ton f.o.b.
Creosote, about 4½d.
Refined tar, 3¾d.
Pure toluole, 2s. 2d. to 2s. 3d.
Pure benzole, about 1s. 9d.
95/160 solvent naphtha, 1s. 7d.
90/160 pyridine, 10s.
All per gallon naked at makers' works.

The Provinces

Sept. 12.

Crude Gas-Works Tar, 15s. to 20s.

To avoid misunderstanding, it is necessary to state that the above price is not claimed to represent a market value. It is a price worked out from week to week upon a system which has been used for many years as a basis for the fixing of certain contracts for crude tar of varying qualities in different areas.

The average prices of gas-works products during the week were: Pitch—East Coast, 31s. to 32s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 31s. to 32s.* Toluole, naked, North, 1s. 7½d. to 1s. 9d. Coal tar, crude naphtha, in bulk, North, 7¾d. to 8¼d. Solvent naphtha, naked, North, 1s. 4½d. to 1s. 5d. Heavy naphtha, North, 1s. 3d. to 1s. 3½d. Creosote, *ex* works, in bulk, North, liquid and salty, 4¾d. to 4¾d.; low gravity, 4¼d. to 4¾d. Carbolic acid, 60's, 1s. 9d. to 2s. Naphthalene, £13 10s. to £16. Salts, 70s. to 75s., bags included. Anthracene, "A" quality, 4½d. to 4¾d. per minimum 40% purely nominal; "B" quality unsalable. Heavy oil: Unfiltered heavy tar oil, min. gr. 1,080, 4¾d. to 4¾d.; filtered heavy tar oil, min. gr. 1,080, 5¼d. to 5¾d.; heavy tar oil, gr. less than 1 080, 4¼d. to 4¾d.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Scotland

GLASGOW, *Sept.* 10.

Very little new business is being arranged and prices remain irregular.

Crude gas-works tar.—Actual value is about 37s. to 38s. per ton *ex* works in bulk.

Pitch is without interest with quotations at about 25s. per ton f.o.b. for export and 23s. per ton *ex* works in bulk for home trade.

Refined tar is unchanged in the home market at 3¾d. to 4d. per gallon, but export business is being solicited at round 3d. per gallon in buyers' packages at makers' works.

Creosote oil.—Market is inactive with quotations approximately as under: Specification oil, 4¾d. to 5d. per gallon; low gravity, 5¼d. to 5¾d. per gallon; neutral oil, 5d. to 5¼d. per gallon all *ex* works in bulk.

Cresylic acid.—There is still a lack of business and prices are easy as follows: Pale, 97/99%, 1s. 5d. to 1s. 7d. per gallon; dark, 97/99%, 1s. 3d. to 1s. 5d. per gallon; and pale, 99/100%, 1s. 8d. to 1s. 11d. per gallon; all according to quality *ex* works in buyers' packages.

Crude naphtha continues to command 5½d. to 6d. per gallon *ex* works in bulk, according to quality.

Solvent naphtha.—90/160 grade is easier at 1s. 3½d. to 1s. 4d. per gallon, but 90/190 heavy naphtha is unchanged at 1s. 1d. to 1s. 1½d. per gallon.

Motor benzole is valued at 1s. 4d. per gallon.

Pyridine.—90/160 grade is now 8s. to 9s. per gallon and 90/140 grade is 9s. to 10s. per gallon.

Benzole Prices

These are considered to be the market prices for benzole at the present time:

	s.	d.		s.	d.	
Crude benzole..	0	9½	to	0	10	per gall. at works
Motor „ ..	1	3	„	1	3½	„ „ „
90% „ ..	1	4	„	1	4½	„ „ „
Pure „ ..	1	8	„	1	8½	„ „ „

Contracts Advertised To-Day

Booster.
Sidmouth Gas Department. [p. 693.]

Coke.
Carlisle Gas Department. [p. 694.]

Coke Screen.
Sidmouth Gas Department. [p. 693.]

Gasholder Construction and Repairs.
Kirkby-in-Ashfield U.D.C. [p. 693.]

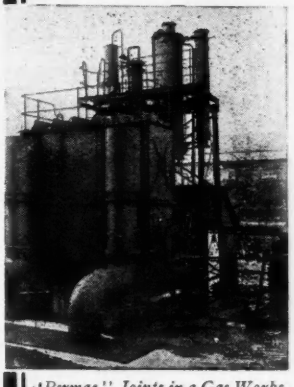
Reinforced Concrete Tanks.
Sidmouth Gas Department. [p. 693.]

Tar and Liquor Separator.
Sidmouth Gas Department. [p. 693.]

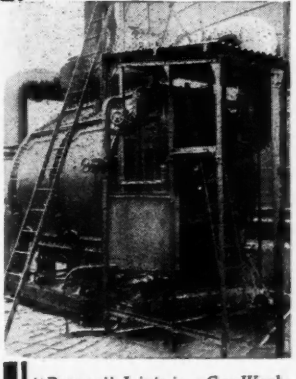
Alloa Gas Undertaking

For the year to May 15, 1938, the quantity of gas sold amounted to 284¼ million cu.ft., being an increase of fully 13¼ million on the previous year. The gross profit on the year's working amounted to £13,762, and after payment of sinking fund £7,757, interest £4,317, income-tax £850, bad debts £6, a net profit of £1,053 resulted. The average price of coal per ton was 20s. 9d., return from residuals was 70·81% of cost of coal, leaving a net cost of coal of 6s. 1d. per ton. Coal carbonized was 20,360 tons, make per ton 16,217 cu.ft. Ordinary consumers number 2,155, automatic consumers 8,086. Average price received per 1,000 cu.ft. of gas sold 2s. 11·16d., or 7·99d. per therm. The capital debt of the Undertaking is £143,008, equal to £433 per million cu.ft. gas made, a sum of £63,000 having been expended during the past two years.

25 Years' Hard!



"Permac" Joints in a Gas Works.



"Permac" Joints in a Gas Works.

Ever since 1913 "PERMAC," the original Metal-to-Metal Jointing, has been holding up difficult joints like these in important Gas Works and on Coke Oven Plants all over the world. Equally suitable for any joint—steam, water, gas, oil — screw pipe or flange.

Send for particulars

Permac
METAL-TO-METAL JOINTING MATERIAL

Sole manufacturers:—

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37, Tabernacle St.
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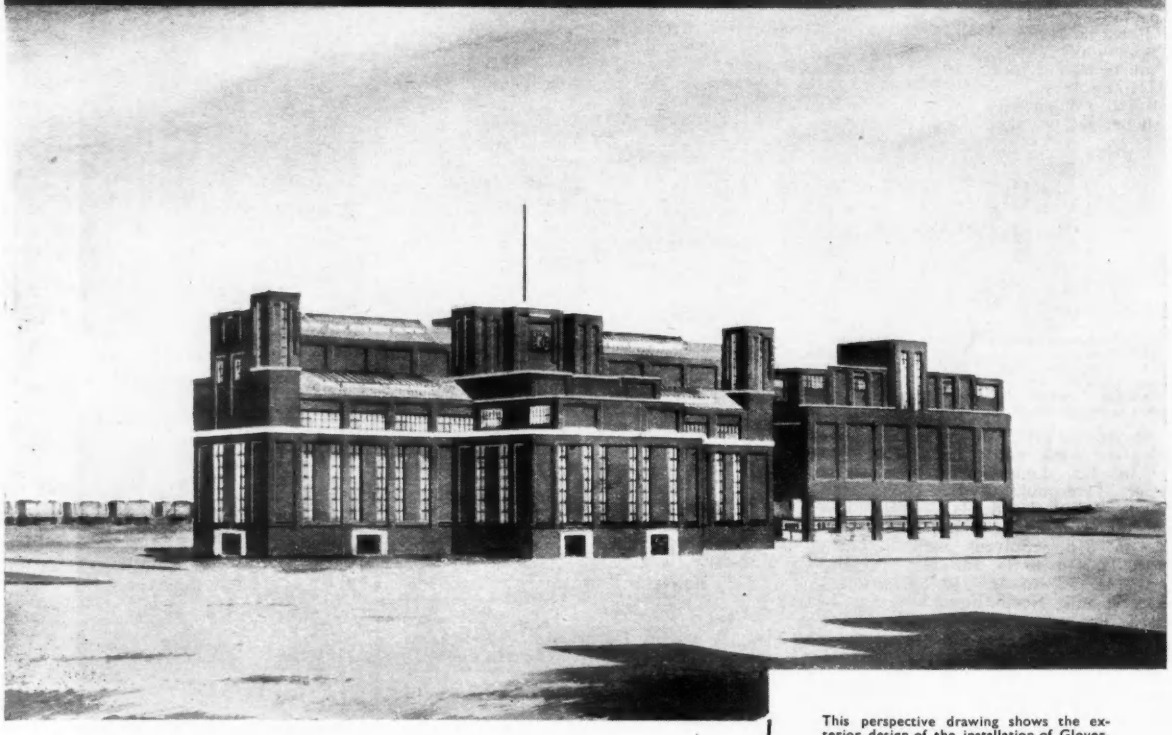
Telephone: Clerkenwell 3351 (2 lines)

NEW

Glover-West PLANT FOR BLACKPOOL



This perspective drawing shows the exterior design of the installation of Glover-West continuous vertical retorts ordered by the BLACKPOOL Gas Department for the new Corporation Gas Works to be established at Marton, as it will appear when completed. Interesting and important new features will make this 72-retort plant, with its extensive coal and coke-handling and waste-heat recovery equipment, an outstanding example of modern advances in carbonizing practice.

A carbonizing plant which will be one of the most complete and economical in operation so far erected in this country.

Dignity allied with utility in architectural treatment will be a striking external feature of Blackpool's new Glover-West installation. It will also embody the many advantages and amenities upon which the world-wide prestige of the Glover-West system has been built during 30 years of constant research and development for the advancement of gas production methods.

WEST'S GAS IMPROVEMENT COMPANY, LTD.

MANCHESTER: Albion Ironworks, Miles Platting 'Phone: COLLYHURST 2961 : 'Grams: "STOKER, MANCHESTER"

LONDON: Columbia House, Aldwych, W.C.2 'Phone: HOLBORN 4108 : 'Grams: "WESGASCO, ESTRAND, LONDON"

GAS STOCKS AND SHARES

The uncertainty of the European political situation continued unabated last week, and the volume of business on the Stock Exchange remained small. In the absence of support prices sagged in nearly all sections, and towards the close even British Funds, which had maintained up till then a firm front, suffered a general decline. Hopes of some improvement in traffics led to support of home rails and a few fractional increases were noted. Industrials became sensitive, the smallest selling movement causing a shrinkage in prices. Oils and rubbers were again dull, and falls were fairly numerous in the mining market.

The volume of business in the Gas market continued small, though the number of transactions was a little heavier than the previous week and quotations on the whole remained fairly steady. Contrary to the experience in many other sections, however, the market was not without a few upward movements, and in the Official List it will be seen that South-Western ordinary recovered 6d. to 17s. and Tottenham ordinary rose 1 to 128½. On the Provincial Exchanges, Hartlepool Consolidated and New were marked down 14½ points to 94½, whereas Newcastle and Gateshead gained 3d., and Chester ordinary 1½ points, while in the Supplementary List, apart from *ex div.* adjustments, Bognor New 7% max. lost 5 points to 150, nominal quotations remained unchanged.

Two interim dividend announcements were made during the week—viz., Severn Valley Gas Corporation 2¼% and South-Western Gas and Water Corporation 2%, both rates being the same as for the corresponding period last year.

Official Quotations on the London Stock Exchange

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Sept. 9.	Rise or Fall on Week.
1,767,439	Sept. 5	8	8	Alliance & Dublin Ord. ...	142—152*	−3
374,000	June 20	4	4	Do. 4 p.c. Deb. ...	93—108	...
734,733	May 9	5	5	Asscd. Gas & Water U'd'ts Ord.	17/6—19/6	...
500,000	,,	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	19/—21/—	...
444,389	,,	§–/4	4	Do. 4 p.c. Red. Cum. Pref.	19/—20/—	...
296,523	,,	4	4	Do. 4 p.c. Irred. Cum. Pref.	16/—18/—	...
500,000	Sept. 5	3½	3½	Do. 3½ p.c. Red. Deb. ...	93—98*	−1
558,890	Aug. 22	7	7	Barnet Ord. 7 p.c.	157—162*	...
300,000	Apl. 4	1/4⅔	1/9⅔	Bombay, Ltd.	24/6—26/6	...
179,915	Aug. 22	9½	9½	Bournemouth sliding scale ...	195—205*	...
590,407	,,	7	7	Do. 7 p.c. max. ...	157—162*	...
493,960	,,	6	6	Do. 6 p.c. Pref. ...	133—139*	...
50,000	June 20	3	3	Do. 3 p.c. Deb. ...	78—83	...
262,025	,,	4	4	Do. 4 p.c. Deb. ...	98—103	...
335,000	,,	5	5	Do. 5 p.c. Deb. ...	115—120	...
357,900	Aug. 8	7½	7½	Brighton, &c., 6 p.c. Con. ...	142—147	...
649,955	,,	6½	6½	Do. 5 p.c. Con. ...	126—131	...
205,500	,,	6	6	Do. 6 p.c. 'B' Pref.	125—130	...
855,000	Mar. 7	7	8	British Ord.	138—143	...
100,000	June 3	7	7	Do. 7 p.c. Pref.	140—145	...
350,000	,,	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	110—115	...
120,000	,,	4	4	Do. 4 p.c. Red. Deb. ...	94—99	...
450,000	,,	5	5	Do. 5 p.c. Red. Deb. ...	102—107	...
450,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	94—99	...
100,000	22 May'33	6	4	Cape Town, Ltd.	1—2	...
100,000	6 Nov.'33	4½	4½	Do. 4½ p.c. Pref. ...	1⅛—3⅛	...
150,000	June 20	4½	4½	Do. 4½ p.c. Deb. ...	60—70	...
626,860	July 18	6	6	Cardiff Con. Ord.	118—123	...
237,860	June 3	5	5	Do. 5 p.c. Red. Deb.	105—110	...
98,936	Mar. 21	2/–	2/–	Colombo Ord....	1⅛—1⅜	...
24,510	,,	1/4½	1/4½	Do. 7 p.c. Pref.	23/—25/–	...
739,453	Mar. 21	–/11·48	–/11·48	Colonial Gas Assn. Ltd. Ord.	16/6—18/6	...
296,144	,,	1/3·30	1/3·30	Do. 8 p.c. Pref. ...	23/—25/–	...
1,775,005	Aug. 8	5	5	Commercial Ord.	79—84	...
140,000	,,	—	§13/4	Do. 4 p.c. Red. Pref.	97—100	...
620,000	June 3	3	3	Do. 3 p.c. Deb. ...	72—77	...
286,344	Aug. 22	5	5	Do. 5 p.c. Deb. ...	113—118	...
200,000	,,	—	§30/2	Do. 3½ p.c. Red. Deb.	99—102	...
807,560	Aug. 8	7	7	Croydon sliding scale ...	135—140	...
644,590	,,	5	5	Do. max. div. ...	105—110	...
620,385	June 20	5	5	Do. 5 p.c. Deb. ...	115—120	...
239,000	Aug. 8	5	5	East Hull Ord. 5 p.c. ...	94—99	...
185,355	Aug. 8	6	6	East Surrey Ord. 5 p.c. ...	116—121	...
176,211	June 3	5	5	Do. 5 p.c. Deb. ...	115—120	...
250,000	July 4	4	8	Gas Consolidation Ord. 'B'...	20/—21/–	...
250,000	May 9	4	4	Do. 4 p.c. Red. Cum. Pref.	17/6—19/6	...
9,223,324	Aug. 8	5⅞	5⅞	Gas Light & Coke Ord. ...	22/3—23/3a	...
2,600,000	,,	3½	3½	Do. 3½ p.c. max. ...	79—82	...
4,477,106	,,	4	4	Do. 4 p.c. Con. ...	99—102	...
2,993,000	July 4	—	3½	Do. 3½ p.c. Red.	100—103	...
8,602,497	May 23	3	3	Do. 3 p.c. Con. Deb....	80—83	−1
3,642,770	,,	5	5	Do. 5 p.c. Red. Deb....	112—115	...
3,500,000	,,	4½	4½	Do. 4½ p.c. Red. Deb....	110—113	...
700,000	Sept. 5	3½	3½	Do. 3½ p.c. Red. Deb....	96—99*	−1½
270,466	Aug. 22	6	6	Harrogate New Cons. ...	117—122	...
157,500	Mar. 21	1/2⅔	‡1/–	Hong Kong and China Ord. ...	¾—1	...
213,200	Aug. 8	6	5⅝	Hornsey Con. 3½ p.c. ...	100—105	...
5,600,000	May 9	8	12	Imperial Continental Cap ...	113—118	...
223,130	July 18	3½	3½	Do. 3½ p.c. Red. Deb....	87—92	...
285,242	Aug. 8	8½	8½	Lea Bridge 5 p.c. Ord. ...	164—169	...
11,751	Aug. 22	10	8	Maidstone 5 p.c. Cap. ...	175—185	...
63,480	June 20	3	3	Do. 3 p.c. Deb.... ...	70—75	...
75,000	May 23	†10	†10	Malta & Mediterranean ...	135—140	...
				Metropolitan (of Melbourne)		
392,000	Apl. 1	5½	5½	5½ p.c. Red. Deb.	99—102	...
231,977	Aug. 22	5	5	M.S. Utility 'C' Cons. ..	99—104	...
968,658	,,	4	4	Do. 4 p.c. Cons. Pref.	95—100	...
360,075	June 20	4	4	M.S. Utility 4 p.c. Deb. ...	97—102	...
148,955	,,	5	5	Do. 5 p.c. Deb. ...	113—118	...
675,000	May 9	†6	†6	Montevideo, Ltd.	73—78	...
250,000	Aug. 8	7½	7½	North Middlesex 6 p.c. Con.	142—147	...
396,160	Aug. 8	5	5	Northampton 5 p.c. max. ...	105—110	...
300,000	Apl. 25	†9	†7	Oriental, Ltd.	147—152	...
468,537	June 3	8	8	Plymouth & Stonehouse 5 p.c.	150—155	...
621,667	Aug. 8	8½	8½	Portsmouth & Gosport Cons.	157—162	...
241,446	,,	5	5	Do. 5 p.c. max. ...	100—105	...
73,350	,,	5	5	Do. 5 p.c. Pref. ...	107—112	...
75,000	,,	4	4	Do. 4 p.c. Pref. ...	94—99	...
114,000	Aug. 8	5	5	Preston 5 p.c. Pref.	104—109	...
247,966	June 3	4	4	Primitiva 4 p.c. Cons. Deb. ...	98—103	...
625,959	July 18	4	4	Do. 4 p.c. Red. Deb.	94—99	...
15,000	Sept. 5	6	6	San Paulo 6 p.c. Cum. Pref. ...	8¼—9*	−¼
441,275	Apl. 25	1/1½	1/1½	Severn Val. Gas Cor. Ld. Ord.	21/—23/–	...
460,810	Mar. 21	–/10½	–/10½	,, ,, 4½ p.c. Cum. Pref.	19/6—21/6	...
133,201	Aug. 22	5	8½	Shrewsbury 5 p.c. Ord. ...	127—132	...
9,000	June 3	4	‡4	South African Ord.	4½—5¼	...
1,371,752	Aug. 22	1/2⅜	1/2⅜	South East'n Gas Cn. Ld. Ord.	22/—24/–	...
871,636	,,	–/10½	–/10½	Do. 4½ p.c. Red. Cum. Pref.	20/—22/–	...
498,818	,,	4	4	Do. 4 p.c. Cum. Pref. ...	18/—20/–	...
450,000	Aug. 8	4	4	Do. 4 p.c. Deb.	99—102	...
150,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	94—97	...
6,709,895	Aug. 8	6	5	South Met. Ord.	105—108	...
1,135,812	,,	6	6	Do. 6 p.c. Irred. Pref. ...	128—133	...
850,000	,,	4	4	Do. 4 p.c. Irred. Pref. ...	95—100	...
1,895,445	June 20	3	3	Do. 3 p.c. Deb.	77½—80½	...
1,000,000	July 4	5	5	Do. 5 p.c. Red. Deb. ...	110—113	+1
600,000	,,	—	§31/–	Do. 3½ p.c. Red. Deb. ...	99—102	...
1,543,795	Aug. 8	6	6	South Suburban Ord. 5 p.c. ...	116—121	...
512,825	,,	5	5	Do. 5 p.c. Pref.... ...	108—113	...
500,000	,,	4	4	Do. 4 p.c. Pref.... ...	95—100	...
250,000	,,	3½	3½	Do. 3½ p.c. Red. Pref. ...	97—100	...
888,587	June 3	5	5	Do. 5 p.c. Deb.	115—120	...
250,000	,,	4	4	Do. 4 p.c. Deb.... ...	96—101	...
200,000	Aug. 8	3½	3½	Do. 3½ p.c. Red. Deb. ...	93—98	...
427,859	Apl. 25	1/2½	9½	S. Western Gas & Water Ord.	16/—18/–	+6d.
160,523	,,	–/10½	–/10½	Do. 4½ p.c. Red. Cum. Pf.	19/—21/–	...
110,000	June 3	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...
750,541	Aug. 8	5½	5	Southampton Ord. 5 p.c. ...	106—111	...
148,836	June 3	4	4	Do. 4 p.c. Deb.	95—100	...
350,000	Aug. 8	5½	5½	Swansea 5½ p.c. Red. Pref. ...	106—111	...
94,000	June 3	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...
1,076,490	Aug. 8	6½	6½	Tottenham and District Ord.	126—131	+1
409,835	,,	5½	5½	Do. 5½ p.c. Pref. ...	117—122	...
62,235	,,	5	5	Do. 5 p.c. Pref. ...	110—115	...
371,850	June 3	4	4	Do. 4 p.c. Deb. ...	96—101	...
85,701	Apl. 25	6	6	Tuscan 6 p.c. Red. Deb.	95—101	...
1,131,550	Aug. 22	6	4	U. Kingdom Gas Cor. Ord. ...	18/6—20/6	...
1,051,280	May 9	4½	4½	Do. 4½ p.c. 1st Cum. Pref.	19/6—21/6	...
762,241	,,	–/1·15	4	Do. 4 p.c. 1st Red. Cum. Pf.	19/—21/–	...
745,263	June 3	4½	4½	Do. 4½ p.c. 2nd Non-Cum.Pf.	16/—18/–	...
1,000,000	Sept. 5	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—98*	−1
373,939	Aug. 8	7	7	Uxbridge, &c., 5 p.c.	132—137	...
133,010	,,	5	5	Do. 5 p.c. Pref. ...	108—113	...
1,371,138	Aug. 8	7	7	Wandsworth Consolidated ...	135—140	...
2,525,768	,,	4	4	Do. 4 p.c. Pref. ...	98—101	+1½
1,343,964	June 3	5	5	Do. 5 p.c. Deb. ...	115—120	...
383,745	,,	4	4	Do. 4 p.c. Deb. ...	97—102	...
400,000	,,	—	§25/–	Do. 3½ p.c. Red Deb.	97—102	...
558,342	Aug. 8	7	6⅞	Watford and St. Albans Ord.	133—138	...
200,000	,,	5	5	Do. 5 p.c. Pref. ...	108—113	...
200,000	,,	5½	5½	Do. 5½ p.c. Pref. ...	118—123	...
200,000	June 3	4	4	Do. 4 p.c. Red. Deb.	96—101	...
100,000	,,	3½	3½	Do. 3½ p.c. Red. Deb.	94—99	...

a.—The quotation is per £1 of stock. * Ex. div. † Paid free of income-tax. ‡ For year. § Actual.

Supplementary List and Provincial Exchanges overleaf.

STOCK AND SHARE LIST—Cont.

Supplementary List, not Officially Quoted, London

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Nominal Quotations Sept. 9.	Rise or Fall on Week.
202,152	Sept. 5	5	5	Ascot Ord.	101—106*	—2
128,182	July 18	5	5	Do. 5 p.c. Pref.	108—113	...
31,035	Aug. 22	-/4⅛	-/4⅛	Associated Utilities 4 p.c. Pref.	16/—18/-	...
100,000	Dec. 13	...	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...
17,000	Aug. 22	8	8	Bognor Orig. Ord. 'A' ...	155—165	...
62,210	,,	8	8	Do. New Addl. 'A' ...	155—165	...
87,160	,,	7	7	Do. New 7 p.c. max. ...	145—155	—5
37,440	Aug. 8	10	10	Cam. Univ. & Town 10 p.c. max.	188—198	...
125,970	,,	7	7	Do. 7 p.c. max.	133—138	...
39,025	,,	5	5	Do. 5 p.c. max.	97—102	...
96,410	July 18	4½	4½	Cardiff 4½ p.c. Pref.	95—100	...
150,000	Aug. 8	4	4	Croydon 4 p.c. Pref.	97—100	...
130,000	June 20	4	4	Do. 4 p.c. Deb.	97—102	...
65,000	Aug. 8	8½	7½	Eastbourne 'A' 5 p.c. ...	140—145	...
198,000	,,	7	6	Do. 'B' 3½ p.c.	115—120	...
112,312	,,	5	5	Do. 5 p.c. Pref.	107—112	...
130,000	June 20	5	5	Do. 5 p.c. Deb.	112—117	...
24,000	Aug. 8	8½	8½	Great Yarmouth 8½ p.c. max.	43—48	...
59,400	,,	7½	7½	Do. 7½ p.c. max.	33—38	...
51,160	June 3	5½	5½	Do. 5½ p.c. Deb.	121—126	...
152,600	Sept. 5	8	9	Guildford Cons.	163—168*	—4
54,055	,,	5	5	Do. 5 p.c. Pref.	107—112*	—1
68,250	June 3	5	5	Do. 5 p.c. Deb.	107—112	...
156,600	Aug. 22	7½	7½	Hampton Court Cons. ...	131—136	...
80,000	Aug. 8	4	4	Lea Bridge 4 p.c. Pref. ...	94—99	...
60,000	,,	6	6	Do. 6 p.c. Pref.	121—126	...
94,876	June 3	4	4	Do. 4 p.c. Deb.	95—100	...
73,620	Sept. 5	8½	8½	Luton Cons. 'A'	153—163*	—2
107,960	Mar. 21	4	5½	Mid Kent Ord.	8½—9½	...
230,940	Aug. 8	10	10	Oxford & District Ord. ...	195—200	...
47,112	,,	5	5	Do. 5 p.c. Pref.	106—111	...
50,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	107—112	...
126,193	May 9	7½	7½	Peterborough Ord.	135—145	...
64,990	Sept. 5	6½	7½	Redditch Ord.	118—128*	—2
166,850	Aug. 8	8	8	Romford Ord.	142—147	...
60,000	,,	4	4	Do. 4 p.c. Pref.	97—100	...
44,000	Mar. 21	5	5	Do. 5 p.c. Deb.	111—116	...
25,570	Aug. 8	5½	5½	Rugby 5½ p.c. Pref.	120—125	...
25,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	104—109	...
42,750	June 3	5½	5½	Do. 5½ p.c. Deb.	118—123	...
110,950	Aug. 22	8	8	Ryde Ord.	140—150	...
270,086	Sept 5	7	7	Slough Ord.	128—133*	...
21,000	June 20	5	5	Do. 5 p.c. Deb.	110—115	...
28,872	May 9	5½	5½	S. Midland Gas Cpn. Ltd. Ord.	19/—21/-	...
28,866	Sept. 5	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	18/—20/-	—6d.
117,228	Aug. 8	7	5	Swindon Cons.	102—107	...
60,425	June 3	5	5	Do. 5 p.c. Deb.	112—117	...
64,380	June 3	5	5	Torquay & Paignton 5 p.c. Pref.	107—112	...
130,000	Aug. 8	8	5	Wakefield Ord.	116—121	...
81,650	,,	5	5	Do. 5 p.c. max.	100—105	...
82,000	Aug. 8	6	6	Weymouth Ord.	103—108	...
98,384	Aug. 22	6	6	Wolverhampton 6 p.c. Pref.	118—123	...
160,000	June 20	5½	5½	Do. 5½ p.c. Rd. Db.	105—110	...
90,000	June 20	5	5	York 5 p.c. Red. Deb. ...	104—109	...
133,640	July 18	6½	6½	Yorktown (Cam.) 5 p.c. Cons.	118—123	...
120,000	,,	5	5	Do. 5 p.c. Pref.	105—110	...
35,000	June 3	5½	5½	Do. 5½ p.c. Deb.	120—125	...

BRISTOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Sept. 9.	Rise or Fall on Week.
347,756	July 18	6	5	Bath Cons.	118—120	...
1,667,250	July 18	5	5	Bristol, 5 p.c. max.	112—114	...
120,420	June 3	4	4	Do. 1st 4 p.c. Deb. ...	101—103	...
217,870	,,	4	4	Do. 2nd 4 p.c. Deb. ...	101—103	...
328,790	,,	5	5	Do. 5 p.c. Deb.	119—122	...
274,000	Aug. 8	5	5	Newport (Mon). 5 p.c. max....	97—99	...
13,200	Mar. 21	7	8⅛	Pontyp'l Gas & W. 10 p.c. 'A'	13—14	...
13,600	,,	5	6	Do. 7 p.c. 'B'	12—12½	...
40,000	,,	5	6	Do. 7 p.c. 'C'	12—12½	...
140,778	Aug. 8	5	5	Weston-super-Mare Cons. ...	108—110	...
64,338	June 20	4	4	Do. 4 p.c. Deb.	100—102	...
33,340	,,	7½	7½	Do. 7½ p.c. Deb.	151—154	...

LIVERPOOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Sept. 9.	Rise or Fall on Week.
157,150	Aug. 8	6½	5	Chester 5 p.c. Ord.	109—111	+1½
92,500	June 20	4	4	Do. 4 p.c. Pref.	95—99	...
36,430	,,	3½	3½	Do. 3½ p.c. Deb.	87—90	...
41,890	,,	4	4	Do. 4 p.c. Red. Deb. ...	97—101	...
2,167,410	Aug. 22	6	6	Liverpool 5 p.c. Ord.... ...	121—123	...
245,500	June 28	5	5	Do. 5 p.c. Red. Pref. ...	97—102	...
306,083	July 18	4	4	Do. 4 p.c. Deb.... ...	100—102	...
106,280	Aug. 8	10	10	Preston 'A' 10 p.c.	198—208	...
188,219	,,	7	7	Do. 'B' 7 p.c.	131—141	...

NEWCASTLE EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Sept. 9.	Rise or Fall on Week.
122,577	Aug. 8	8	8	Blyth 5 p.c. Ord.	161—162	...
732,000	Aug. 22	5	5	Hartlepool G. & W. Cn. & New	94½—95½	—1½
2,061,315	Aug. 8	5½	5	Newcastle & Gateshead Con.	22/6-23/3a	+-/3
682,856	,,	4	4	Do. 4 p.c. Pref. ...	99—100	...
776,706	June 20	3½	3½	Do. 3½ p.c. Deb. ...	88½—89½	...
277,285	May 9	5	5	Do. 5 p.c. Deb. '43 ...	104—106	...
332,351	Aug. 22	6	6	Sunderland 6 p.c. max. ...	135—136	...

NOTTINGHAM EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Sept. 9.	Rise or Fall on Week.
542,270	Aug. 8	9	6	Derby Con.	133—143	...
55,000	June 3	4	4	Do. 4 p.c. Deb. ...	100—105	...
20,000	June 20	5	5	Long Eaton 5 p.c. Pref. ...	10—12	...
80,000	,,	5	5	Do. 5 p.c. Deb. ...	105—110	...

SHEFFIELD EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Sept. 9.	Rise or Fall on Week.
10,000	Aug. 8	10	10	Great Grimsby 'A' Ord. ...	205—215	...
6,500	,,	10	10	Do. 'B' Ord. ...	205—215	...
79,000	,,	10	10	Do. 'C' Ord. ...	195—205	...
1,806,339	Aug. 22	6½	6½	Sheffield Cons.	139—141	...
95,000	July 4	4	4	Do. 4 p.c. Deb.	101—103	...

a The quotation is per £1 of Stock. * Ex div.

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